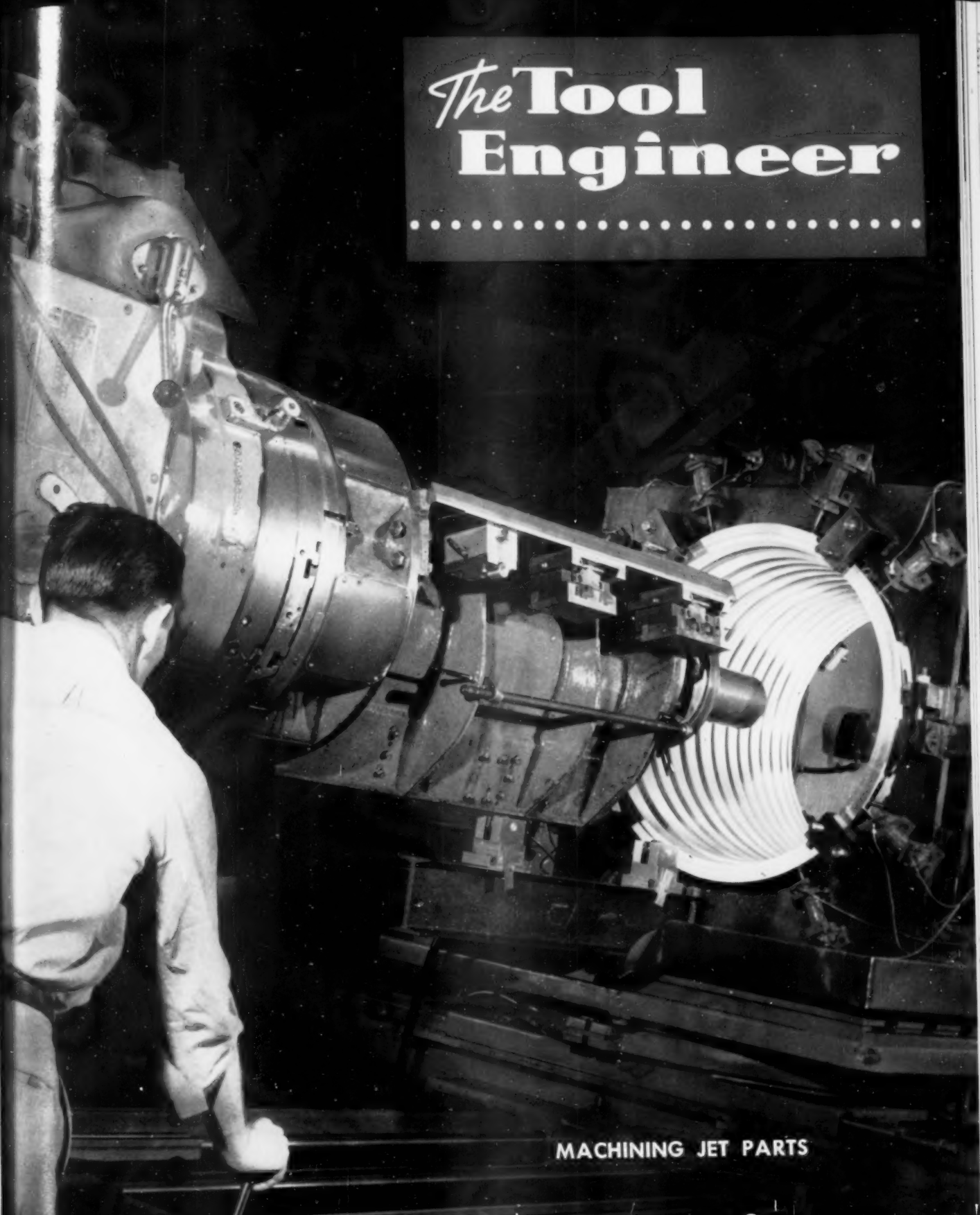


The Tool Engineer

.....



MACHINING JET PARTS

PUBLICATION OF THE AMERICAN SOCIETY OF TOOL  ENGINEERS

MAY, 1953

PLANNING
ENGINEERING
CONTROL

OF

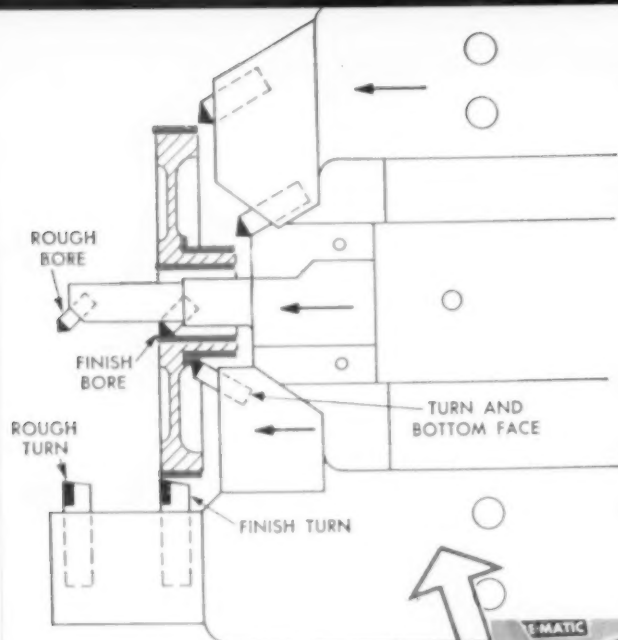
TOOLING
EQUIPMENT
PRODUCTION

multiple surfaces get the

ALL-OVER

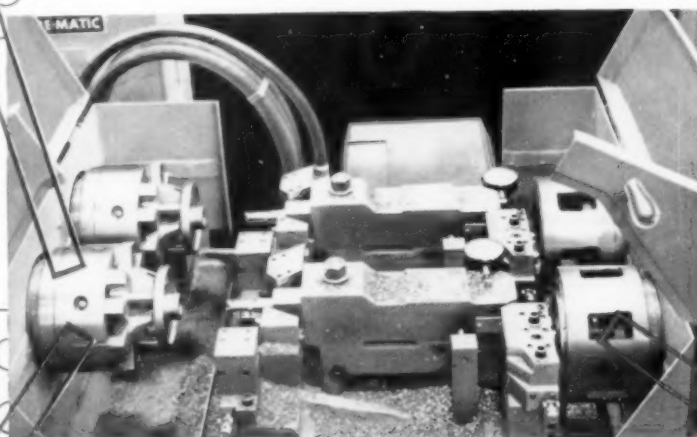
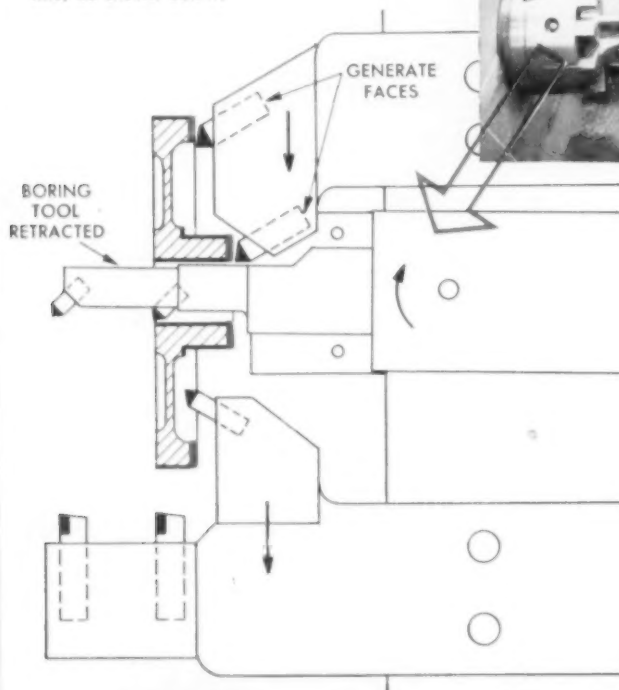
borizing treatment

*Model 222 Bore-Matic precision finishes
helical gear blanks on all contact surfaces
in continuous-production setup*



1st Operation, left end stations: load, table rapid traverses left, slows to rough bore and turn, then slows further to finish bore, turn and bottom face, as shown above.

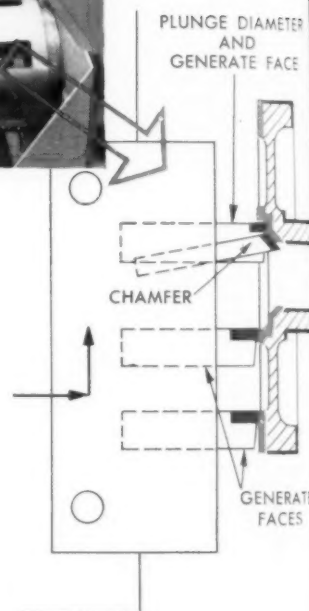
2nd Operation, left end stations: contact switch starts cross-slide forward to generate face of part, automatically shifting bridged-over dial-bar boring tool to eliminate drag line, as shown below.



With the tooling arrangement shown above, this four-station, double-end machine turns out precision borized cast iron gear blanks two at a time — with no time out for loading and unloading.

Each blank is bored, faced, turned and chamfered on a total of eleven surfaces. Parts are bored, turned and faced on flange end at the two left-hand stations, both 1st and 2nd operations being done at each station. Then parts are transferred to the right-hand stations for the remaining operations. The operator is able to load one end while the other end is borizing, eliminating handling time from the work cycle. The machine cycle and sequence of operations are illustrated in the accompanying diagrams.

Remember—when it comes to precision finishing, it pays to come to Heald.



For final operation on right end of machine, table rapid traverses right and cross slide indexes to rear to finish two faces and a chamfer, as shown above.



Case Study

No. 2238-96 in

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Cover: Finish boring and grooving operations on J-47 jet engine compressor stator casing. Special tooling on this horizontal mill utilizes 19 separate tools working simultaneously. Machining for roughing and finishing requires approximately two hours and is discussed in the article beginning on Page 63.



The Tool Engineer

Volume XXX, No. 5

May, 1953

TECHNICAL ARTICLES

Where Are We Going in '53 (Editorial)	By Roger F. Waindle	33
Tool Materials for Punches and Dies	By Lester F. Spencer	35
Gadgets		41
Piercing Die	By Hjalmar Dahl	
Drilling Glass Plates	By Ernest J. Druan, Jr.	
Part Ejector	By Charles Hayward	
Variable Pressure Pin	By Wm. V. Anderson	
Expanding Collet Mandrel	By Charles Spicer	
Gaging Involuble Splines	By Leon N. DeVos	43
Automation of Machine Tools (Part II)	By Julius Y. Kaplan	50
Special Gaging for High Precision Production	By G. E. Durham	57
Bonding Rubber to Metal		
Design and Production Problems	By J. H. Gerstenmaier	59
Jet Engine—Parts Produced in Record Time (Tool Engineering in Action)	By John W. Greve	63
Developing Special Machines		
To Increase Production and Reduce Costs	By R. L. Kessler	70
Ball Bearing Lubrication (Reference Sheets)		75

ASTE NEWS

National Officers Elected at Annual Meeting	By Nancy L. Morgan	80
ASTE Annual Report		83

DEPARTMENTS

Abstracts of Foreign Literature	171	NEWS in Industry	166
Field Notes	163	Technical Shorts	158
Good Reading	160	Tools of Today	117
Letter from the Editor	3	Trade Literature	168
News in Metalworking	112	Who's Meeting—and Where	170
Advertisers' Index	292		

THE TOOL ENGINEER is regularly indexed in *The Industrial Arts Index*.

AMERICAN SOCIETY OF TOOL ENGINEERS

THE TOOL ENGINEER is published monthly in the interest of the members of the American Society of Tool Engineers. Entered as second-class matter, November 4, 1947, at the post office at Milwaukee, Wisconsin, under the Act of March 3, 1879. Yearly subscription for members, \$2.00. Non-members, \$6.00. Canada, \$6.50; all other countries, \$8.00 per year. Copyright 1953 by the American Society of Tool Engineers.
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The Tool Engineer

What Is Wanted

Specifications require that the designer knows what he wants and is able to indicate those wants concisely on his drawings. Likewise, the tool engineer, whether redesigning or tooling for production, must be able to understand and to interpret specifications without any doubt as to their meaning. Otherwise, costly errors inevitably result. When a model goes into production, all critical tolerances should be established and properly identified so that no questions remain regarding the proper functioning of any component.

Insofar as tolerances are concerned, engineers have been wont to indicate limits much closer than actually needed, feeling that it is better to be safe than sorry. This inexcusable attitude has often been responsible for a lack of respect among production men. Like the fable about the boy who called wolf, close tolerances may be regarded in a casual manner, even those upon which the proper functioning of the part depends. Whichever—a tolerance closer than necessary or one not observed—the economic waste cannot be tolerated in our production system.

Often, however, real misunderstanding has resulted in scrapped parts. Perhaps the designer has employed a reference point from which it is impossible to gage a part. Or, the terminology may be vague or have an entirely different meaning to the gage expert. As an example, the production of splines has been a headache to many shops.

To clarify this situation, the ASME and ASA have defined terminology for splines. This information has been applied by Leon DeVos in his article beginning on Page XX and shows how mating splines should be specified and gaged to get the fit required and to avoid interference. Its use should dispel cause for misunderstanding and produce the splined parts that are wanted.

John W Greve

EDITOR



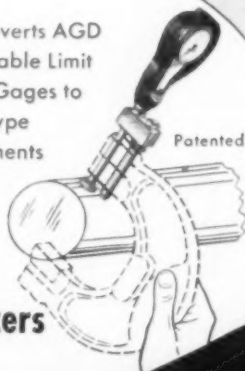


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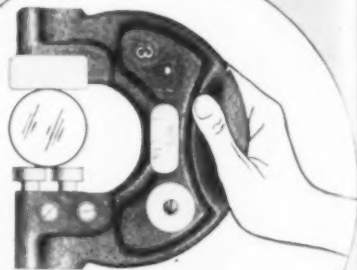
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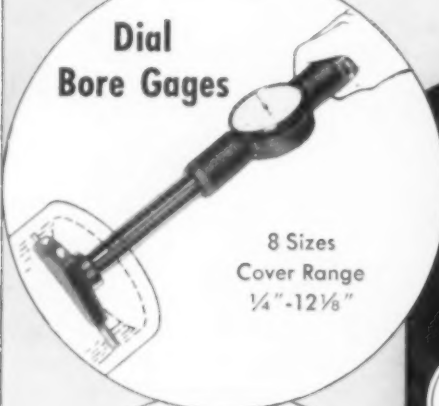


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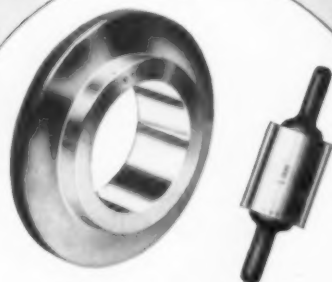
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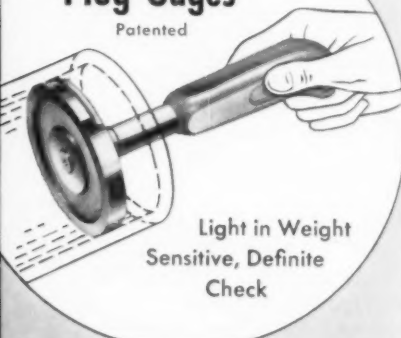
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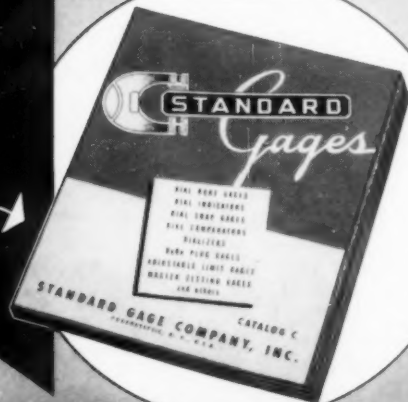


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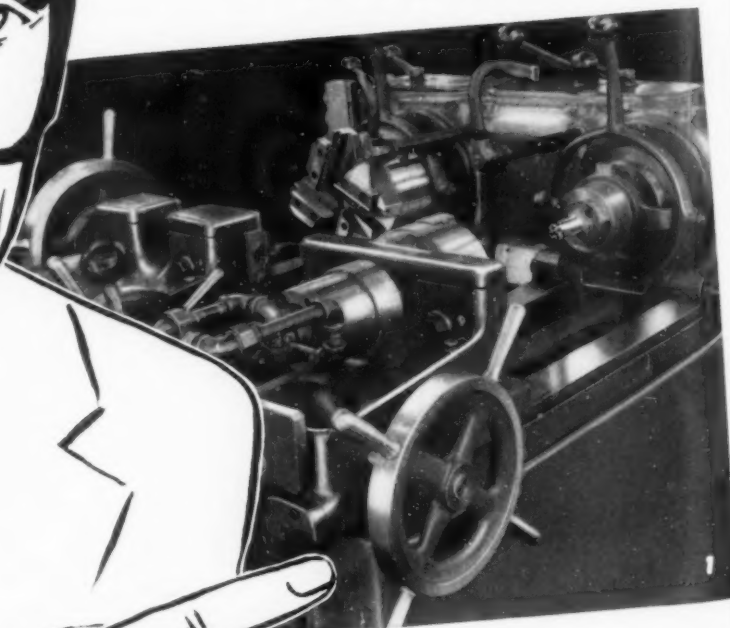
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2. (Right): A special Collapsible Tap used to thread 12" to 18" valve bodies for seat ring insertions. Landis Valve Seat Taps are individually engineered for their particular usage and are supplied to tap valve bodies ranging from the 2" to the 24" size.

4. (Right): A LANTO Taper Cutting Head designed for producing tapered threads up to 2 1/4" in length and to unusually close tolerances. The die head can be converted to cut a reverse taper cam. Diameters from 1/2" to 2" and tapers ranging from zero to 2" per foot can be cut with this LANDIS Head.



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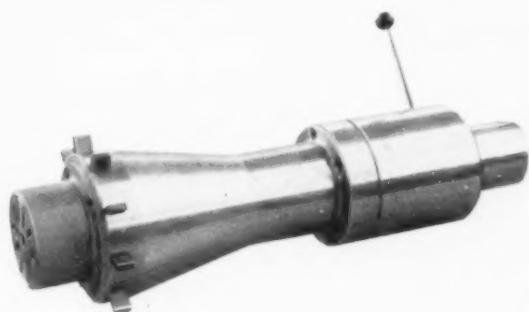
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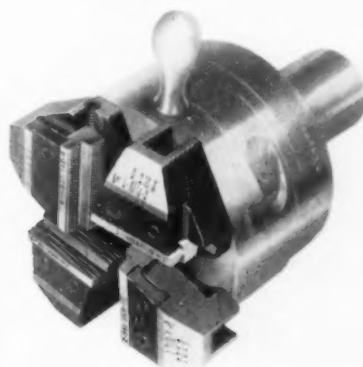
best serve a particular function is employed; we will advise as to the best standard equipment to produce a specific thread; we will develop special tooling for the production of an unusual or difficult thread; we will design special holding fixtures for threading workpieces that are difficult to chuck; or we will work out special methods to best fit multiple threading operations into the complete production process.

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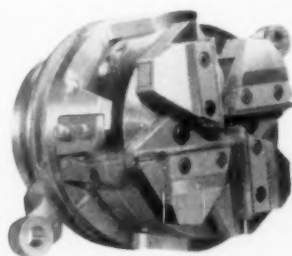


2

3. (Right). Double Diameter Chasers used to generate threads on reducing bushings and similar work pieces. These chasers cut threads simultaneously; on two different diameters simultaneously; thus, eliminating a second operation. Pitch and thread form for the two diameters must be identical and other limitations necessitate individually designed chasers for threading parts of different dimensions.



3



4

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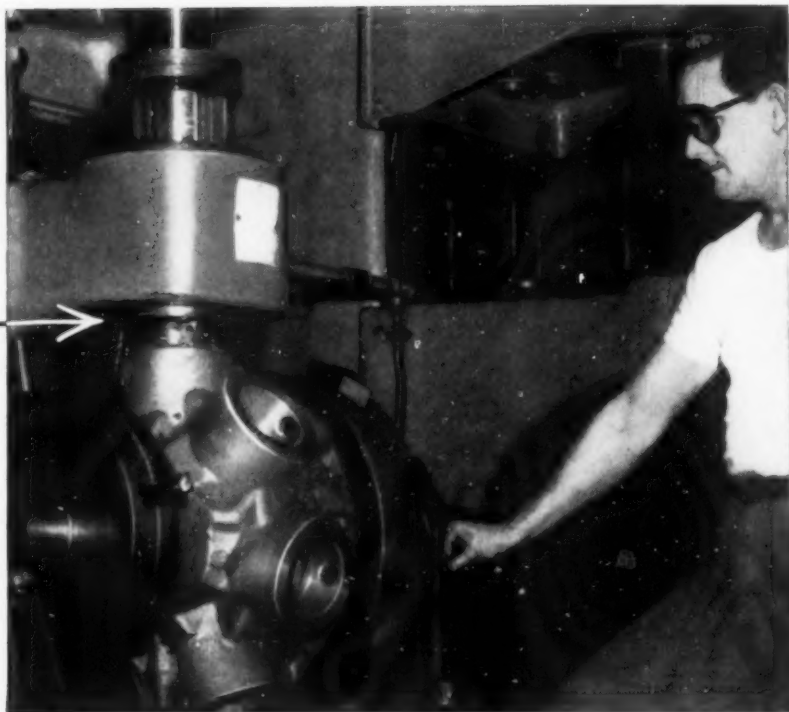
This boring head, containing 20 HAYNES STELLITE inserted blades, operates for 4 to 6 weeks without grinding.



Here is how the HAYNES STELLITE blades are positioned in the boring head.

A multiple blade boring head containing 20 HAYNES STELLITE alloy inserted blades operates from 4 to 6 weeks without regrinding at a plant making refrigeration and air-conditioning equipment. The tools bore, chamfer, counterbore, drill, and face the cylinder ports in cast iron compressor heads. This is all done in one operation.

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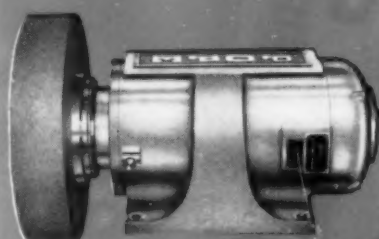
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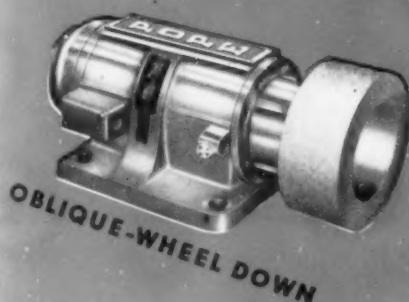
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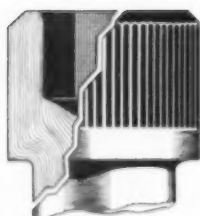
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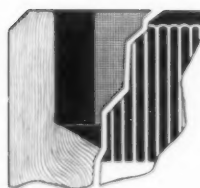
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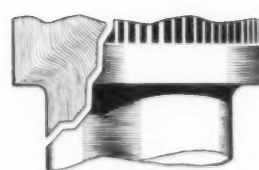
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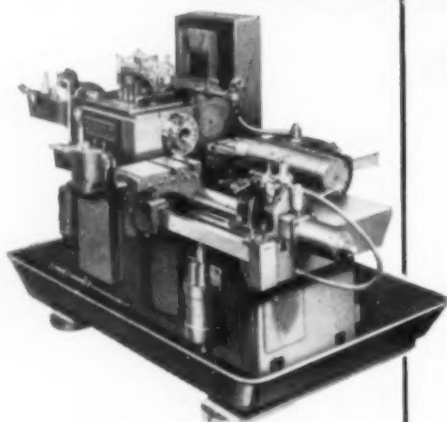
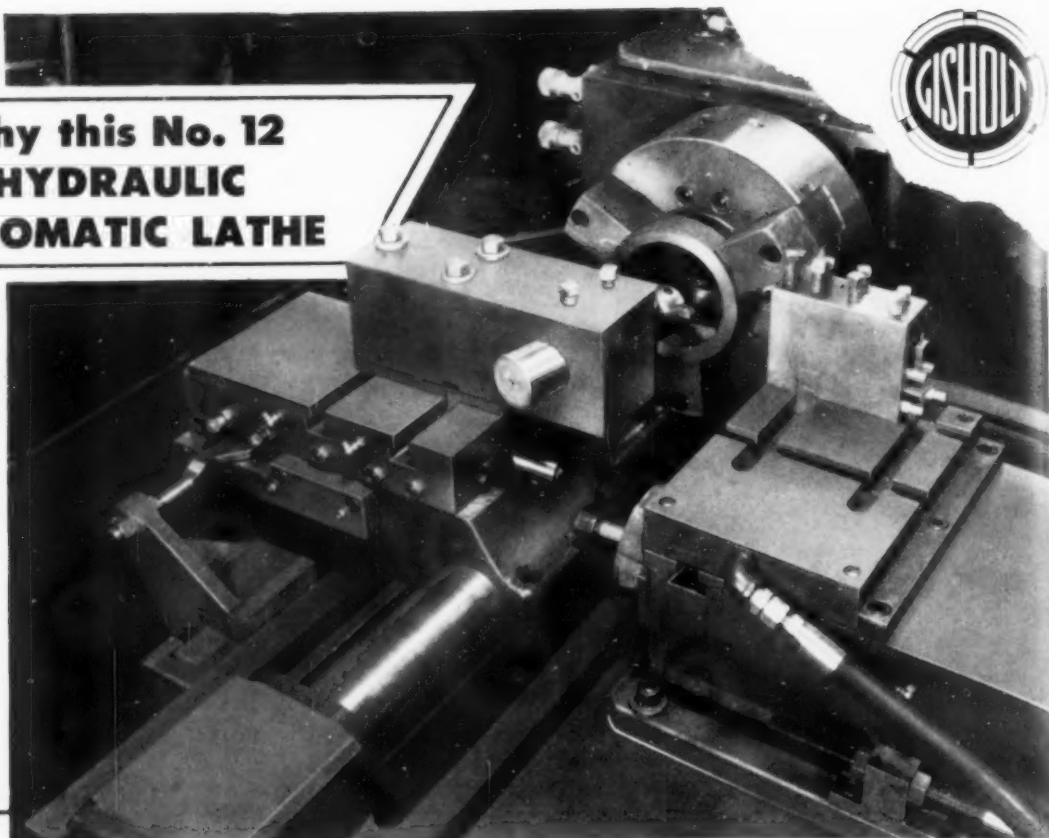


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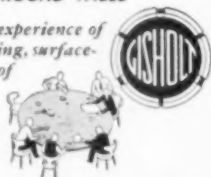
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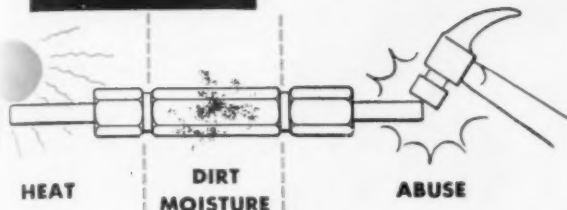
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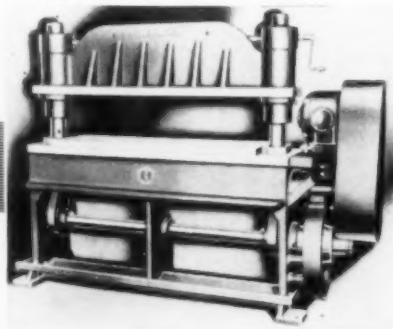
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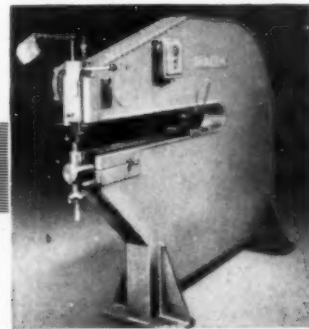
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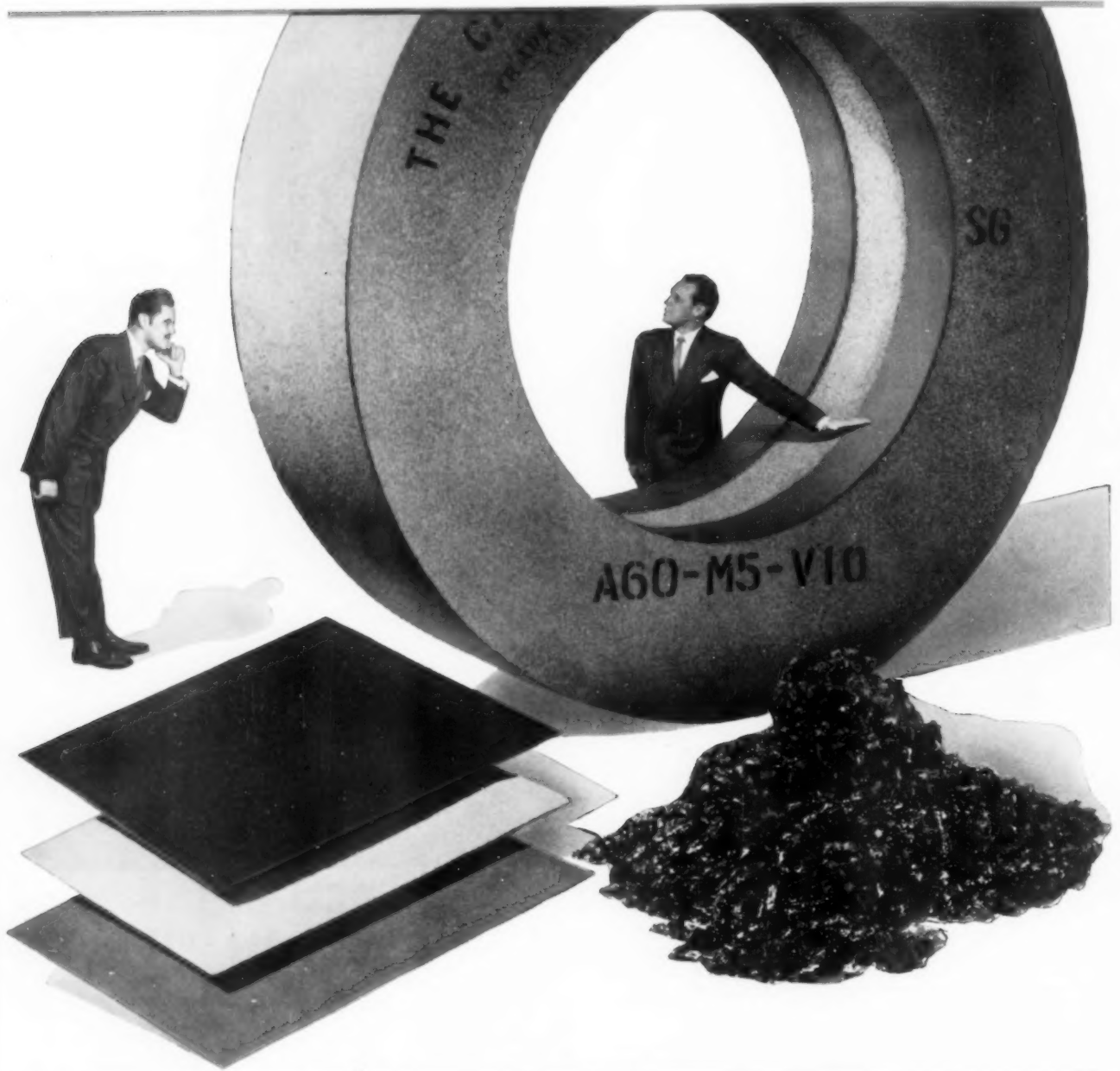


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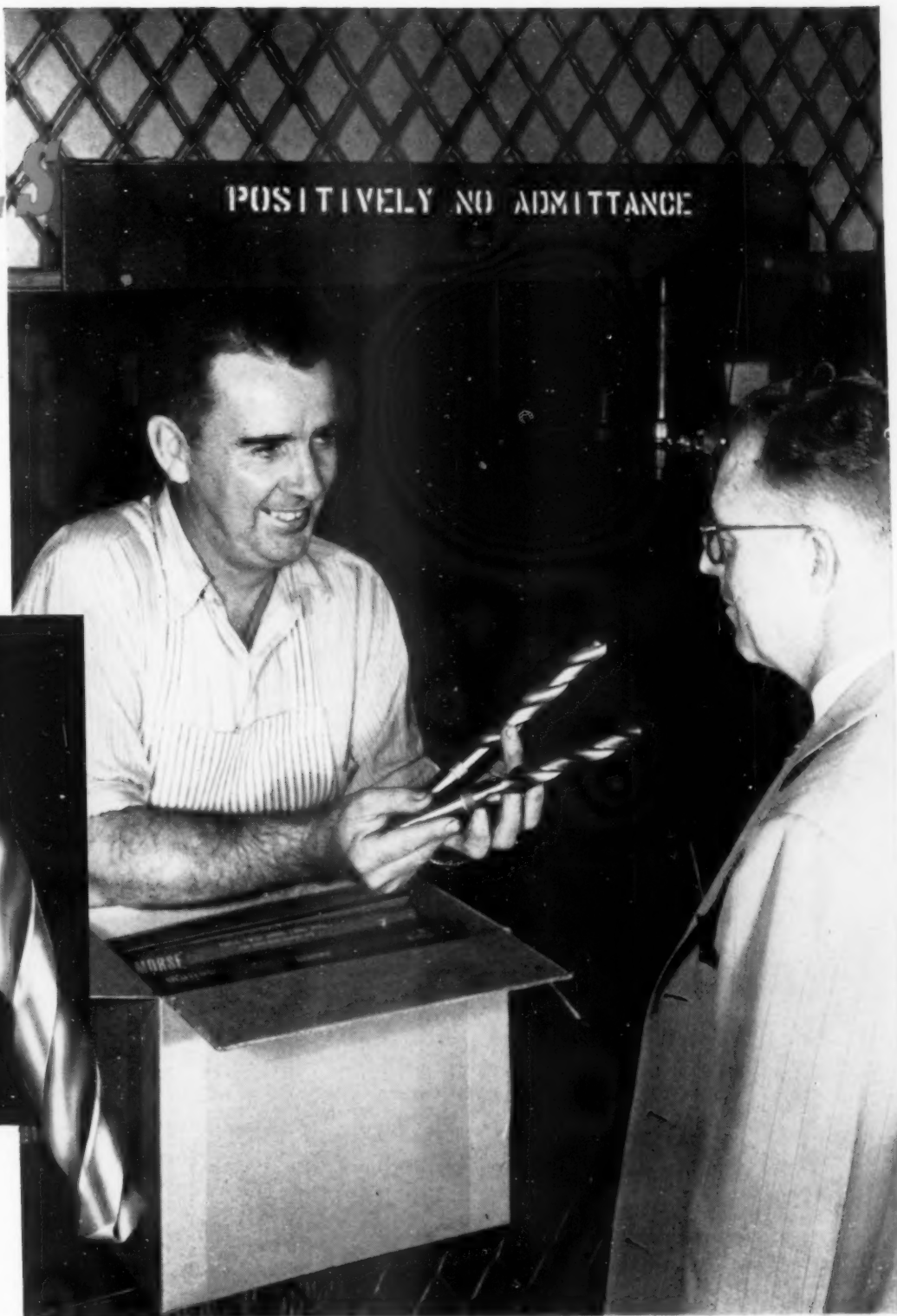
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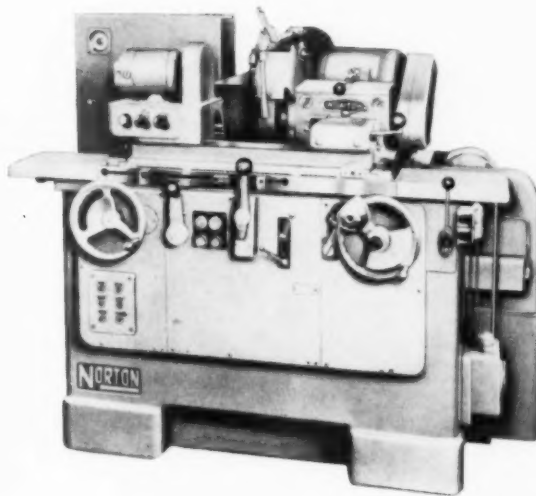
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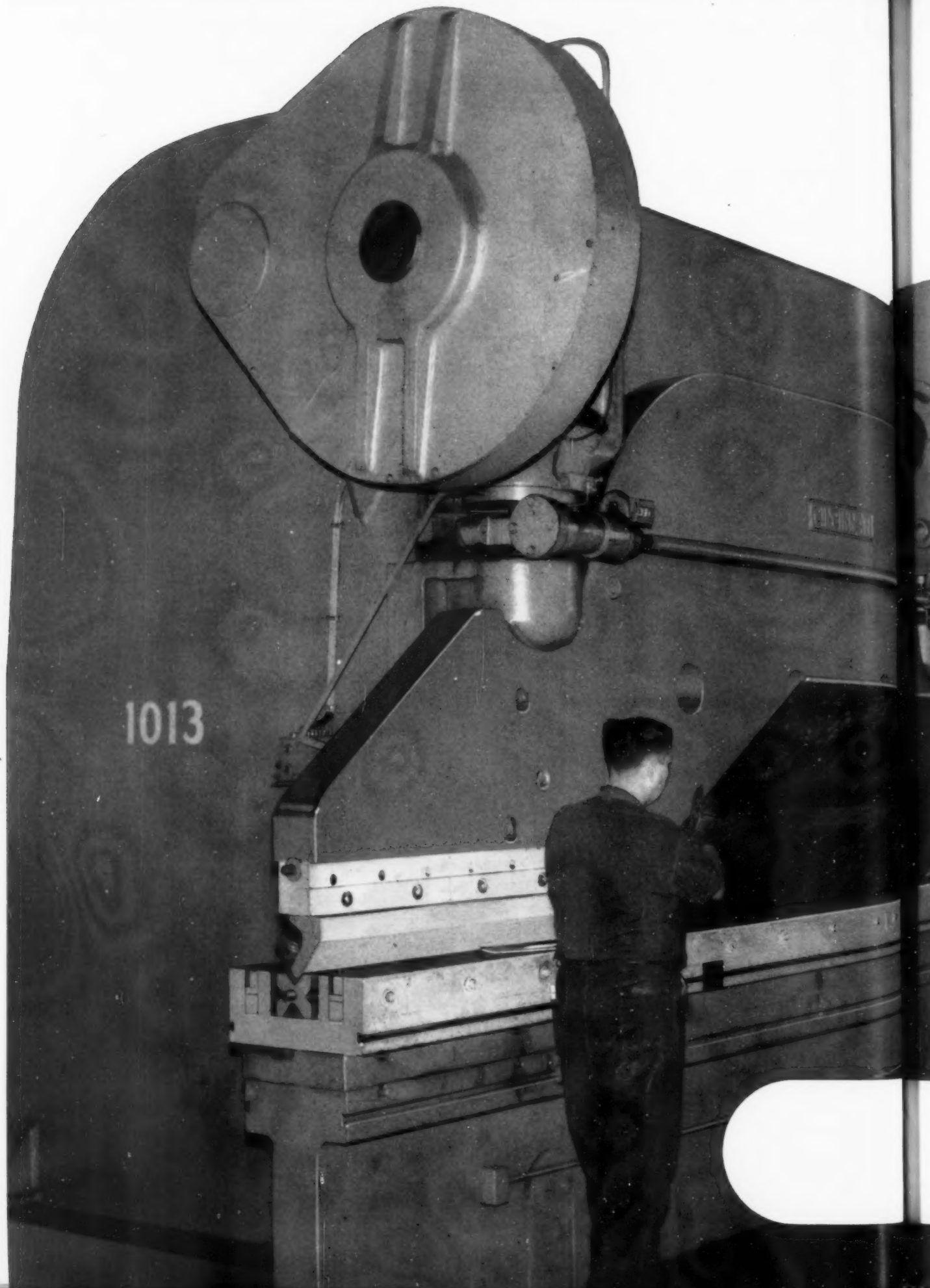
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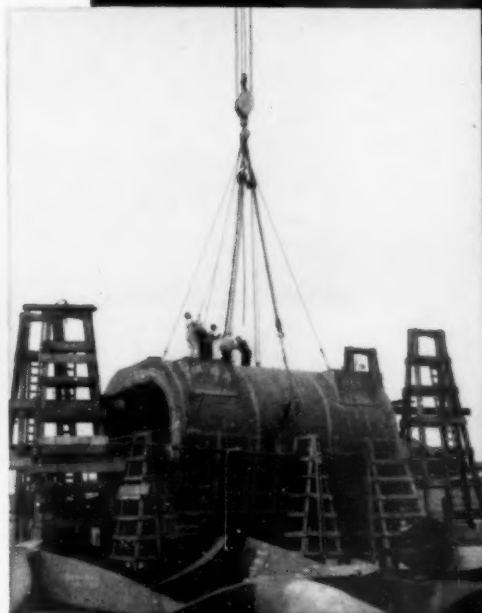
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Photographs courtesy of The Maryland Drydock Company, Baltimore, Maryland

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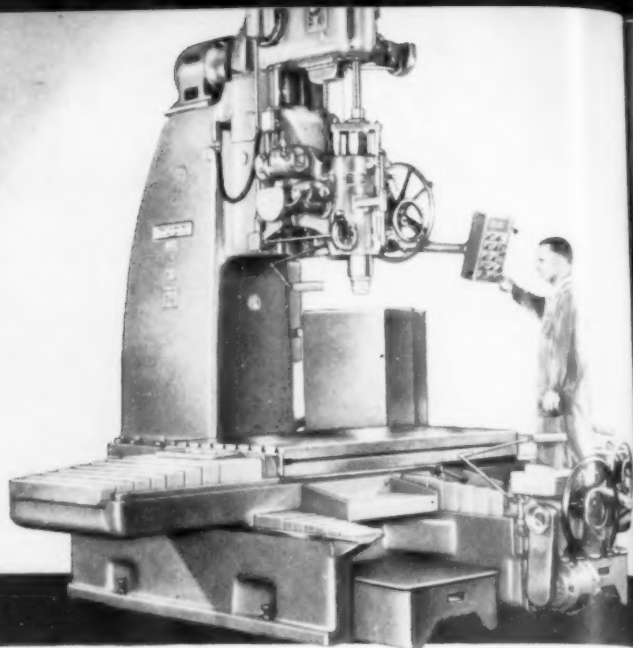
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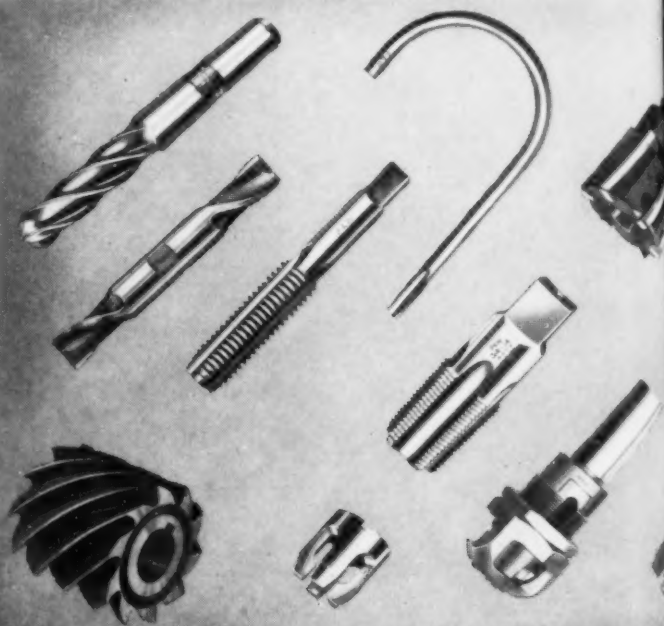
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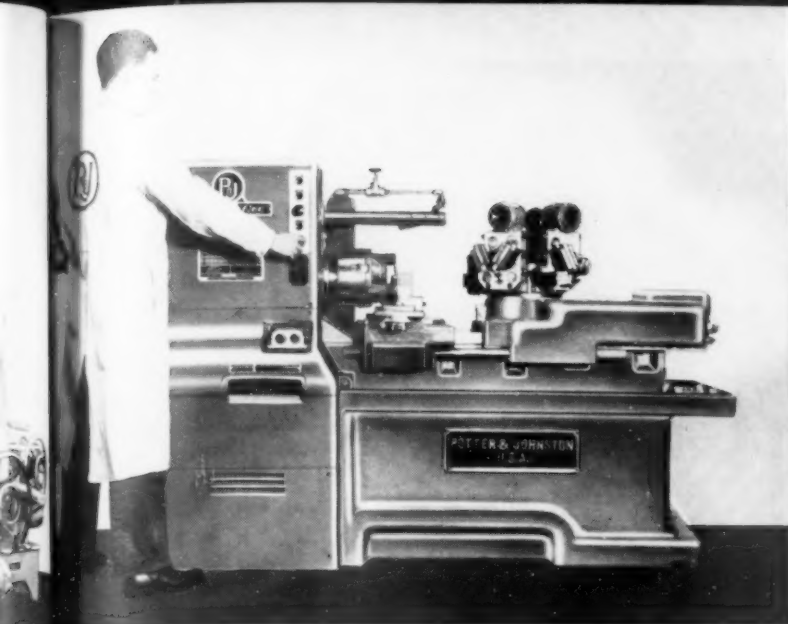


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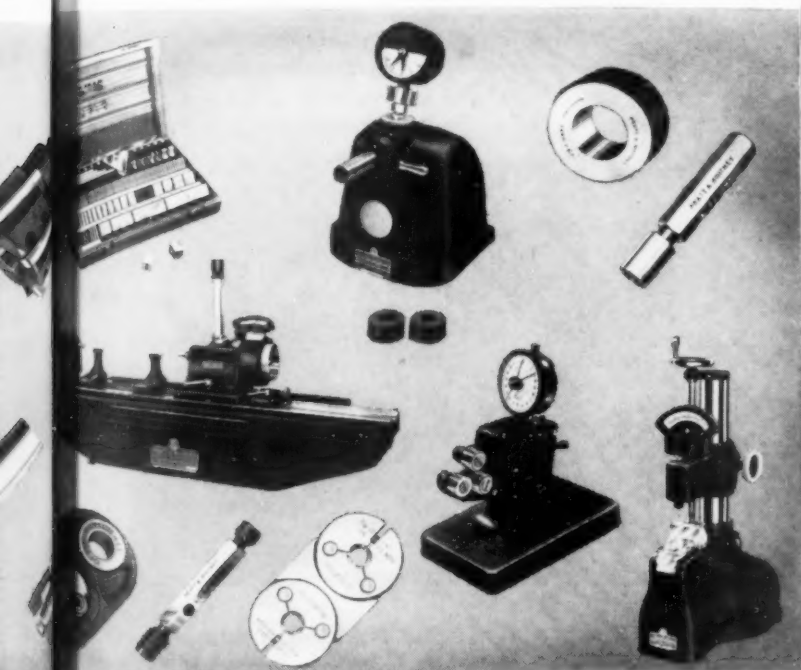
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Exploded view showing Beaver's simple, positive, blade locking system.

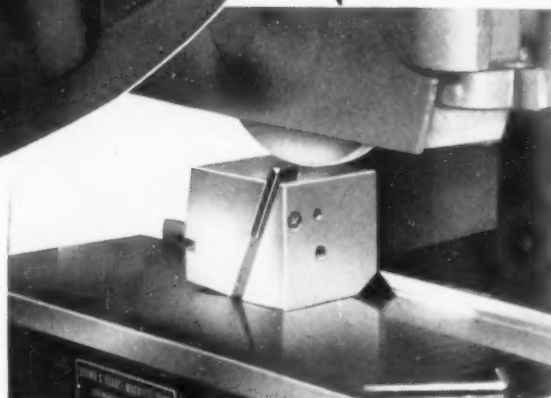


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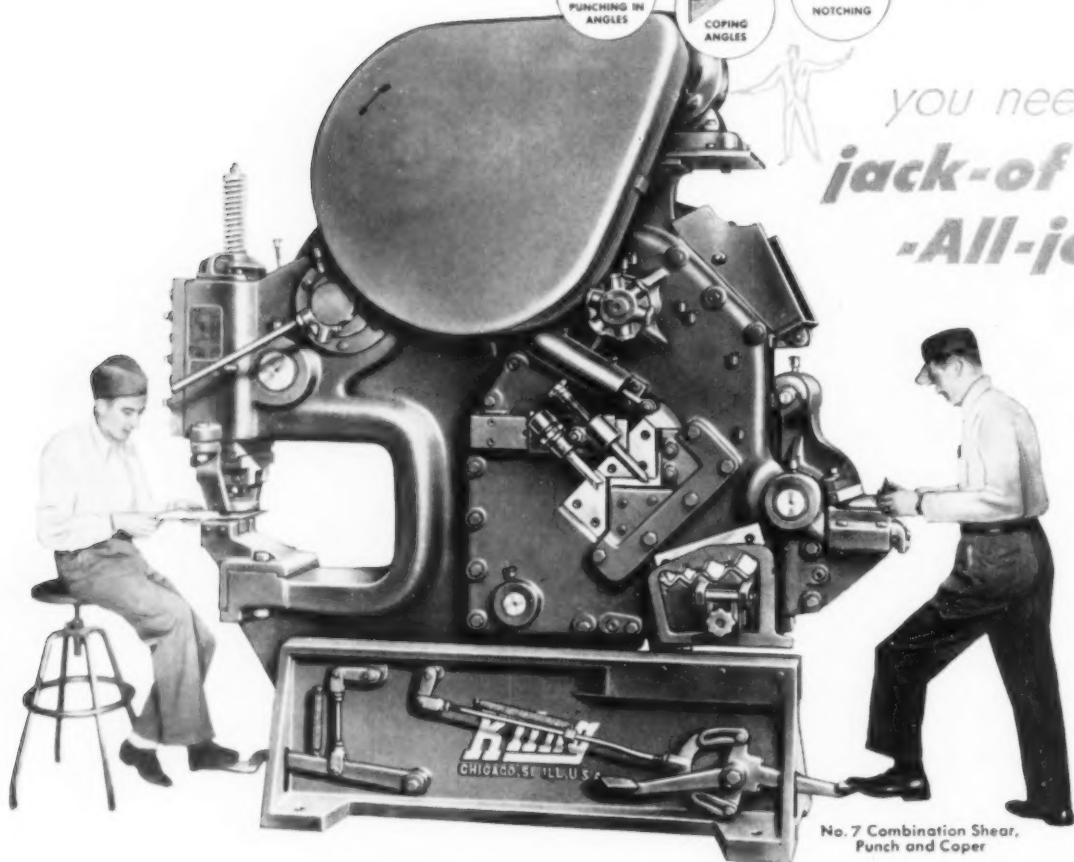
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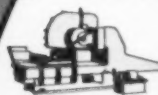
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The Tool Engineer

Where Are We Going in '53?

A SOCIETY is made up of individual members—not companies, not just names, but individuals. They are the people who make things run, who get things done. At times, we are impressed with the size of a company which may have big buildings, many tools, great prestige. But that company is composed of people and it is financially or, more comprehensively, socially successful in direct ratio to the energy, ability, honesty and humanity of the people directing it.

Outwardly, ASTE's principal contribution to industry is enhancing that second attribute—ability—by education. We have done an excellent job through our chapter technical programs, our national programs, regional conferences, TOOL ENGINEER articles, publications—and we're going to do better.

We increase the energy tempo by stimulating ideas, by sparking enthusiasm, by showing how individual efficiency can be improved, thus reducing mental downtime.

Honesty is very important—some are honest because they have a natural desire to be alive in a wonderful world that can only be wonderful to you if God is standing at your side. Some are honest because it's best for them in the long run and they are smart enough to know it. By our example we can influence the others.

Humanity comes back to people. The ASTE is people, pure and simple, banded together for self-help—inter-education maybe we can call it. We are helping each other and thereby improving ourselves both technically and socially. As time goes on, the healthy influence of ASTE on the wholesome growth of the human phase of industrial activity will be increasingly felt.

What we have been leading up to, then, is that ASTE recognizes both the broad and the detailed moral influence it possesses and plans to do more about it in '53!

R. F. Waindle

PRESIDENT
1953-1954



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BRANCH OFFICES AND WAREHOUSES IN PRINCIPAL CITIES

TOOL MATERIALS

for Punches and Dies

By Lester F. Spencer

Chief Metallurgist
Landers Frary & Clark
New Britain, Conn.

IN PRESS ROOM OPERATIONS such as blanking, punching or drawing, the choice of tool material has frequently been based on past experience; this method of choice is sound in policy under a specific set of conditions of operations. When new operating conditions arise in the press room, tool material selection is often on the basis of the metallurgical factors involving each analysis. This method of choice involves comparison of properties and, in many instances, may involve discussion with the supplier of the tool material.

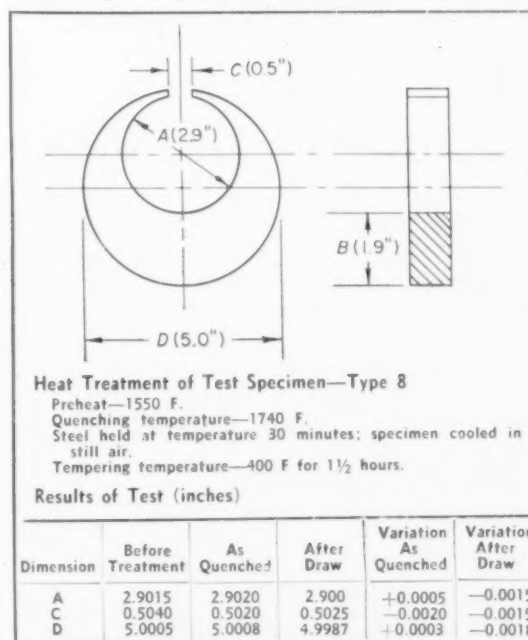
If practical experience has shown that a relatively expensive steel has less tendency to crack or distort during the hardening phase than cheaper tool steels, the use of the more expensive steel may be justified. This is particularly true as the proposed die becomes more intricate. Also, if an expensive heat treatment is specified, justification for this additional expense must be realized through increased service life of the tool. It must be kept in mind, especially for small to medium size dies, that the cost of the material forms only a small proportion of the total cost of the tool.

To determine the adaptability of the tool steels available for a specific job, the individual characteristics, properties and behavior should be considered. The factors involved in rating the tool steel compositions include: dimensional stability during heat treatment; susceptibility to decarburization; hardness penetration; grain size; toughness; and for cutting tools, red hardness.

In choosing a tool steel, the importance of the quenching medium is apparent, since its selection is closely correlated to the distortion and internal stresses within the tool. Thus, water hardening

tools show greater movement than tool materials which are oil quenched and the oil hardening steels show a greater movement than do the air hardening types. Although some allowances can be made for movement in the original construction of the die, it is apparent that the importance of this factor increases with the intricacy of the die. Although it is difficult to predict the actual movement on a complicated die, from data obtained from a test specimen as shown in Fig. 1, they can be used for a comparison of different materials or for different methods of quenching.

Fig. 1. Specimen for distortion test.



Courtesy—Vanadium Alloy Steel Co., Pittsburgh, Pa.

Table 1—Decarburization Limits

Diameter or Thickness (inches)	Maximum Depth of Decarburization (inches)		
	Carbon Steels	Alloy Steels	High Speed Steels
Up to and including 1/2	0.016	0.016	0.012
1/2 to 2	0.032	0.032	0.020
2 to 3	0.062	0.062	0.040
3 to 5	0.125	0.125	0.080
Over 5	0.1875	0.1875	0.120

Depth hardness is the second factor which is largely controlled by the chemical composition. Thus, an increase in the alloy content has a tendency to decrease the difference in hardness between the surface and the core. The grain size of the tool material is usually specified as fine grain; this factor is determined both by mill practice and in the heat treatment method. It is generally conceded that coarse-grained steels will harden more deeply, distort more in heat treatment, have less toughness and be more susceptible to both quenching and grinding cracks than the fine-grain steels.

The susceptibility of a steel to decarburization depends upon its chemical composition. Those analyses containing relatively high percentages of silicon, molybdenum and cobalt have a greater tendency toward decarburization than steels containing other alloying elements. The very high carbon steels, exemplified by the high carbon high chromium compositions, show a greater tendency to partial decarburization only because the carbon content is extremely high. Therefore, proper precautions on most of the high alloy steels must be practiced during heating operations. In regard to decarburization, incoming bar material will have a certain amount of soft skin. The values as suggested in TABLE 1 can be used as a guide. This value represents the amount of material which should be removed from the surface before treating.

Toughness is a highly desirable property in any type of tool steel, and is often defined as the ability of the material to absorb energy without breaking. It is determined by the use of either the ten-

sion and tension impact, the torsion and the torsion impact, or the notched and unnotched Charpy and Izod tests.

Tool Steels: The more commonly used tool steels for press room applications are listed in TABLE 2. The straight carbon tool steels, type 1, and both the low alloy steels containing either chromium or vanadium, types 2 and 3, can be considered as a single classification on the basis of quenching procedures. Almost any job can be done with some degree of success by these water hardening steels; however, if any one of the five following conditions should exist, it is suggested that the choice of material be either an oil or air hardening composition.

1. Where parts to be hardened have any of the following features:

- Drastic dimensional change such as a thin section projecting out of a thick section.
- Sharp internal corners or insufficient radius in the corners.
- Numerous holes separated by thin webs, as in dies.

2. Where maximum wear resistance is required.

3. Where toughness or shock resistance is a prime consideration.

4. Where minimum dimensional change is required during heat treatment.

It is difficult to set up definite recommendations for the use of both the carbon and the low alloy steels as represented by types 2 and 3 by analysis alone, since choice is established by such factors as hardening characteristics, available heat-treat equipment, size of die section, service requirements.

These analyses are readily machinable, have fairly good shock resistance due to their tough cores and are not inherently subject to excessive decarburization when normal precautions in heat treatment are observed. However, if maximum surface hardness is required without grinding, a

Table 2—Tool Steel Materials Generally Used in Press Room Operations

Type Number	Chemical Composition (percent)						
	Carbon	Manganese	Chromium	0.20/0.50 Vanadium	Tungsten	Molybdenum	Others
1	0.85/1.10						
2	1.10		0.20/0.75				
3	0.85/1.10						
4	0.90	1.20	0.50	0.20	0.50		
5	0.90	1.60	0.35*	0.20*		0.30*	
6	1.20		0.50	0.25	1.75	0.25*	
7	0.90	2.50	1.50			1.10	
8	1.00		5.00	0.50*		1.00	
9	2.15		12.00	1.00*	1.00*		Ni - 0.5*
10	1.00		12.00	0.50*		0.80	Ni - 1.0*
11	1.50		12.0	0.50*		0.80	Co - 3.5*
12	0.50			0.25*		0.50	Si - 1.0
13	0.55	0.80	0.30*	0.25*		0.50*	Si - 2.0
14	0.55		1.25	0.25*	2.50	0.50	

*Optional

controlled atmosphere furnace or a liquid heat bath for hardening should be employed. In quenching from the hardening temperature, brine quenching is preferred because it results in more positive response to treatment insuring uniform surface hardness. In tempering, the temperature may vary from 300 to 650 F and should be held at temperature at least one hour per inch of thickness. In applications where wear resistance is the primary consideration, the lower temperature value is used, resulting in a Rockwell C64 hardness value; the hardness decreases with accompanied increase in toughness as the tempering temperature is increased.

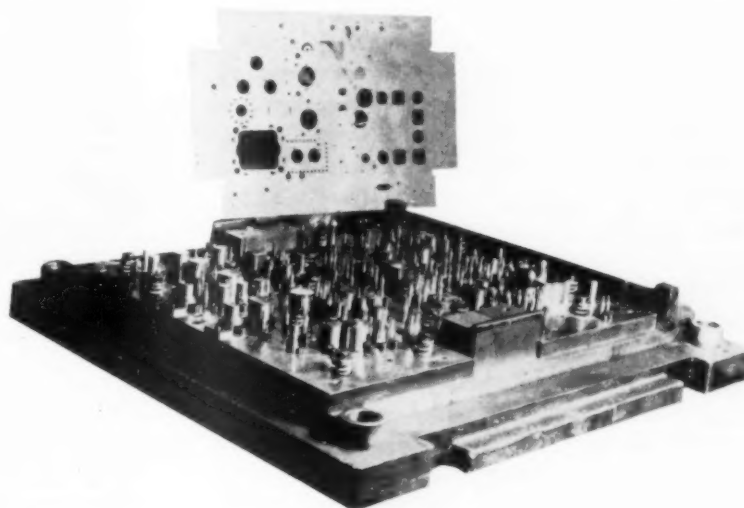
The die steels for cold work represented by types 4 to and including 11 are considered as safe hardening and nondeforming compositions. The composition of these steels will range from a com-

practice as to atmosphere, time and temperature must be satisfactory. A tempering temperature of 350 F is usually satisfactory, giving a hardness of approximately Rockwell C62.5. In any event, especially for a type 4 composition, a tempering temperature of 450 F should not be exceeded due to the possibility of embrittlement within the range of 450 to 600 F.

If martempering is considered in the heat treatment of the low manganese oil hardening analysis, type 4, it should be employed only under strict metallurgical control, or where the repetitive nature of the work allows the development of a practical heat-treat procedure. If martempering is employed, the following procedure is recommended: heat for quenching in the normal manner; quench in hot salt which is at 400/425 F; do not quench for more than 10 minutes; remove from salt and

Fig. 2. Die for radio panel bottom plate. It is made from either a manganese oil hardening type 4 steel or from air hardening high carbon-high chromium type 11 composition.

Courtesy—Bethlehem Steel Co.



paratively low alloy steel, such as manganese oil hardening types 4 and 5 to the very high alloy high carbon-high chromium represented by types 9, 10 and 11. The only physical property in common within this wide range is that they can be either oil or air hardened, and, therefore, show a minimum tendency to movement or warping in hardening. In regard to wear resistance, they range from among the lowest to practically the highest in the tool steel field. The selection of material within this specific group will usually be on the basis of such factors as wearing ability, movement to be expected in hardening, and cost of both the material and its fabrication, *Fig. 2*.

Both of the manganese oil hardening steels, type 4 and 5, are fairly easy to machine in the annealed condition, are safe hardening, have good toughness and wear resistance and have low distortion in hardening. Both compositions are oil quenched and they are not inherently subjected to excessive decarburization. Thus, good furnace

cool to approximately 150 F; and, temper immediately to desired hardness. It is important that adequate salt volume and circulation be provided to insure effective quenching.

Since the manganese oil hardening steels have little of the elements which produce hard, wear resisting carbides, it is difficult to state whether better wear resistance as compared to the carbon steels is obtained. The hardness obtained on similar sections of both steels will indicate that the manganese types will not have as high a Rockwell; however, after tempering, both are used at about the same hardness range.

The analysis indicated by type 7 is known as a manganese air hardening steel and is used for similar types of work, *Fig. 3*, as are the manganese oil hardening grades. This analysis has the advantage, over the higher alloy steels within this group, that a relative low hardening temperature of 1575 F can be employed, which would indicate less decarburization and scale. Pack hardening of

large sections to insure maximum surface hardness is recommended; in this instance, a blast of dry air is required as the quenching medium for sections of 2 inches or more. The best combination of hardness and toughness is obtained by tempering the section at 400 F. A Rockwell hardness of C60 can be expected.

The five percent chrome air hardening type of tool steel is used for dies, punches and similar forming and blanking tools as recommended for the previous types. This composition is employed where less distortion in heat treatment or better wear resistance is required. Due to the alloy content, pack hardening is preferred to either the controlled atmosphere or salt bath heat treatment is to be employed. In hardening, a preheat of approximately 1200 F precedes the high heat of 1775 F. Although this composition type is primarily an air hardening grade, it is occasionally quenched in oil; however, more distortion will be encountered. For the average press room work, a 350 to 400 F tempering temperature is usually employed immediately after the die has been quenched, with a resulting hardness of Rockwell C60.

The high-carbon high-chromium compositions, as indicated in types 9, 10, and 11, are used to a large extent on applications of drawing, blanking, etc., where maximum production life is expected. These steels have a high resistance to abrasion, due to the numerous extremely hard carbides. Compared with the lower alloy steels, machinability is rather poor. In addition, these compositions are somewhat sensitive to grinding stresses. Thus, oversize allowances for machining should be held to a minimum to avoid the necessity of excess grinding for finishing. In general, for grinding it is usually advisable to use a soft wheel with the largest possible grain size commensurate with the finish desired. A generous amount of coolant should be employed and light cuts be made to avoid the danger of cracking.

Alloy type 9, although it contains an extremely high carbon content, is essentially an oil hardening analysis. Due to the higher carbon content, it has the highest initial as-quenched hardness of any of the tool and die grades. Although the carbon lessens its toughness, this is somewhat compensated for by the decreased depth of hardenability. Alloy type 10, usually having nickel to increase the toughness, is used where greater shock resistance than that obtained in either types 9 or 11 is required. Oil quenching is recommended to develop full hardness on medium and heavy sections, whereas light sections and tools of intricate designs are usually air quenched to minimize cracking. Alloy type 11 is the air hardening grade and is used for applications requiring long runs, for close tolerances on the finished product and

for minimum change in size, *Fig. 4*. Although it contains less carbon than type 9, the alloy content besides chromium within this analysis permits air hardening even in large sections. A further advantage of this type is that it can be machined with comparative ease when annealed to a maximum softness.

The silicon type alloy steels, as indicated by types 12 and 13, are used occasionally, the analysis as represented by type 13 having a higher hardenability, *Fig. 5*. Their lower carbon content indicates that they are suitable for applications where toughness of the tool steel is a prerequisite. The

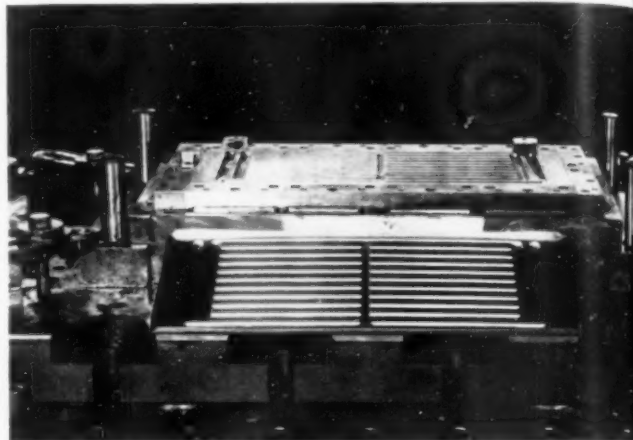


Fig. 3. Shaping or sizing die made from a type 7 composition for evaporator parts. It is made from 0.042-inch thick cold rolled steel.

Courtesy—Bethlehem Steel Co.

graphitic die steels are becoming popular materials for press room applications. Thus, the most popular type known as Graph-Mo, containing 1.45 percent carbon, 0.90 percent manganese, 1.25 percent silicon, and 0.25 percent molybdenum, is employed for blanking dies and punches, drawing and forming dies for large parts and heavy gages of sheet strip, dies for cold trimming, and draw punches.

This specific graphitic analysis is an oil hardening, nondeforming type of tool steel which possesses remarkable machining properties. It is used for applications requiring good resistance to wear and abrasion. The graphitic pockets retain the lubricant, which is of specific advantage on tools which require nonseizing properties. The working hardness of the die material is dependent upon the specific application. Thus, in a blanking and forming die, a working hardness of Rockwell C63 to C64 is recommended, indicating tempering at 300 F for a period of four to six hours after oil quenching. On a piercing punch, a working hardness of Rockwell C58 to C60 is recommended. This is obtained by tempering the hardened section at 450 F for about four hours. Also, on either a multiple blanking die or a combination of form-

ing and piercing die, a recommended Rockwell hardness of C55 is suggested. This is obtained by tempering the hardened section at 750 F for a period of four to eight hours. The length of time at the tempering temperature is in accordance to the size and wall thickness of the die or punch.

Recommended procedures for hardening the various tool steels under discussion have been given as a guide; the general practice may, of course, vary in accordance with the specific conditions of the shop. When pack hardening, it is usually recommended that a thermocouple be inserted in the pack near or in contact with the tools to be positive concerning the proper time element. The pack material should be neutral. One suggested packing material is burnt pitch coke. In many instances, it is advisable to temper immediately after the hardening operation, preferably before the part has cooled to room temperature. Thus, the steel should be allowed to cool in the quenching medium to approximately 150 to 200 F to insure an effective quench, after which it is placed in the tempering furnace.

Sintered Carbides: If unusually long production runs are anticipated or an application requires maximum abrasive wear, the use of sintered carbide has become a natural choice. TABLE 3 shows various grades of carbides for press room use, each grade tailored to fit certain requirements. Following is a guide for using the various grades. The hardest and most resistant to edge and surface wear within this grouping is type 1. It is employed on die sections for blanking parts from thin or ductile material. Type 2 is considerably tougher and more shock resistant than type 1, but it still has good wear resisting characteristics. In instances where type 1 is employed as a die section, type 2 is used for punches. This material is also used for die sections in the blanking or punching of heavier material when a tougher grade of carbide is used as the punch.

The grade represented by type 3 is considered the all-purpose material, having a combination of

resistance to wear and shock. It is widely accepted for blanking of silicon steel laminations for electrical motors and transformers. Type 4 is tougher and does not have the wear resistance as exhibited by the first three grades. It is often employed where a greater factor of safety is desired. The toughest grade within the grouping is type 5. It is slightly harder than the hardest high-carbon high-chromium nondeforming steel and, therefore, more wear resistant.

The choice of carbide for any particular application is determined by such factors as material to be worked, the press to be employed, the type of tooling, the method of mounting the carbide section, the delicacy of the tooling, and the lubricant.

The efficient use of carbides and the choice of grade will depend upon the condition of the press, which should be rigid, have good alignment, a good feed mechanism and sufficient speed and power. In regard to both die design and mounting of the carbide for press room operations such as blanking, punching or drawing, no detailed information will be given. However, it is suggested that the various suppliers of carbide be asked to provide the necessary technical aid for the specific problem. In the latter phase, it can be said that both solid and segmented carbide nibs are available, the choice being dependent upon the specific application and design. These carbide nibs are ordinarily placed in a less expensive material either by shrink fits or by mechanical holding. The first method is usually restricted to cylindrical sections.

Although the cost of carbide inserts used in dies and punches for press metalworking operations is greater than that for tool steel materials, the use of this material may be justified where long production runs are expected. Surface smoothness measurable in fractions of a microinch are attainable, and this ability to take and maintain a smooth finish leads to longer life through decreased wear. It is obvious that the smoother the die or punch, the less tendency there will be to score or mark the material in process, and the less will be the effect of this scoring on the working

Fig. 4. (left) Steel washer die made from air hardening high carbon-high chromium tool steel, type 11. Run is one million pieces. (right) Die for $\frac{3}{8}$ -inch ceiling bell spring. It is made from air hardening high carbon-high chromium type 11 steel. Run is 200,000 pieces.

Courtesy—Bethlehem Steel Co.

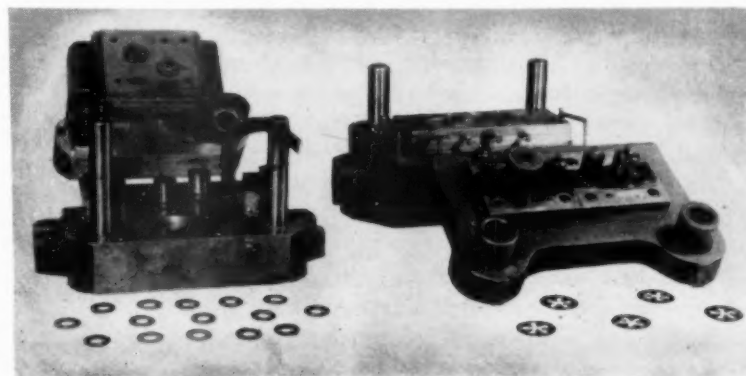


Table 3—Approximate analysis of Typical Sintered Carbides Used for Press Room Activity⁴

Type	Application Characteristics	Rockwell Hardness		Analysis (percent)			Strength (psi)	
		C	A	WC	Co	TaC	Comp.	Trans. Rupture
1.	Light shock; highly wear resistant	76.0	90.5	94.0	6.0	....	480,000	260,000
2.	Medium shock; good wear resistance.	73.0	88.5	87.0	13.0	....	414,000	350,000
3.	Closest to a universal grade. Combines the greatest degree of toughness and wear resistance.	72.0	88.0	85.0	15.0	....	400,000	360,000
4.	Tough, not quite as wear resistant as type 3.	69.0	86.0	75.0	20.0	5.0	391,000	.....
5.	Extreme toughness, more wear resistant than high-speed steel.	65.0	84.0	70.0	25.0	5.0	354,000	.....

parts. In addition, closer tolerances can be maintained and factors such as freedom from burrs and less downtime are advantages obtained with carbides. However, as with any other type of material, the job must be carefully studied to justify the use of this more expensive material.

Other Types of Die Materials: For forming and drawing dies aluminum bronze is known for its antifriction qualities. Thus, Ampco Metal, Inc. first introduced their alloys No. 21 and No. 22, which have sufficient hardness and compressive strengths to resist forming sheet pressures and, in addition, eliminated troublesome pickup, scratching and galling. Of fairly recent origin is their alloy No. 24 which is reputed to have as much as five times the die life of previously used bronzes. This alloy type can be employed in forming and drawing such material as stainless steels, Inconel and monel metal. No heat treatment is required, since the alloys are used in the cast condition. Machining this alloy should present little difficulty if the recommendations of the supplier are followed.

In general, dies made from this material should be thoroughly backed up and solidly seated to prevent cracking. In addition, these dies need careful handling. In many instances, an increased hold-down pressure over that used on steel dies is required. A new or redressed die should be run in slowly before operating at production speeds. For the first 25 pieces drawn, a thick lime water coating is used as a lubricant, resulting in work hardening the surface of the radius with consequent increase of die life and less redressing. After this run-in period, the regular lubricants can be employed.

According to recommended practice, blanks should have no burrs or upturned edges and, in addition, unpickled or dirty stock should be either formed or drawn. This die material is not recommended for drawing the copper base alloys and it will not serve satisfactorily as blanking on punch draw dies.

Meehanite is used as a die material, the as-cast and machined die material being submitted to a hardening and tempering procedure similar to that used for the tool steel compositions. This high

tensile cast iron material is said to be free from pickup when in the hardened and polished condition, due to the distribution of the graphitic particles within the matrix which has an additional lubricity above that given by the drawing lubricant employed. Those grades which may be improved by a heat treatment are types GM, GA and GB. However, in any specific application where Meehanite is used as a die material, the suggestions of the supplier of this material should be requested.

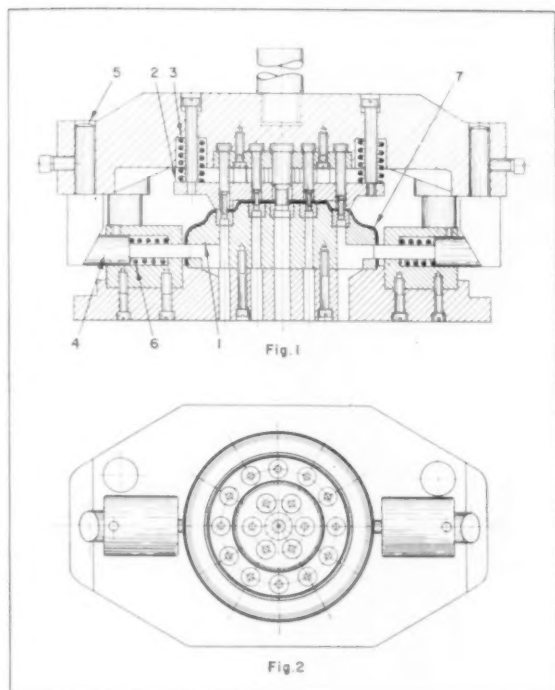
A hardening temperature of approximately 1600 F is employed with a quenching medium of either oil or water, depending upon the degree of hardness desired. The tempering operation is performed on the casting while it is still warm, approximately 300 F or over. A tempering temperature of approximately 400 F will produce a Brinell hardness of approximately 472. A time period of from one to two hours per inch of casting thickness is recommended. In the event that greater toughness is desired, the tempering temperature may be varied from 500 to 730 F. The hardness values obtained on type GA Meehanite is 461 Brinell at 500, 415 Brinell at 600, and a 375 Brinell at 700 F. In conjunction with the raise in tempering temperature, the value of the Charpy impact test results increase for type GA Meehanite. These values are approximately 2.7 ft-lb at a 400 F temper, 6.5 ft-lb for a 500 F, 9.5 for a 600 F temper, and 15.5 ft-lb for a temper at 700 F.

References

1. *Metals Handbook*, 1948 ed., pp 653-676, American Society for Metals, Cleveland, Ohio.
2. *Bethlehem Tool Steels*, Bethlehem Steel Co., Bethlehem, Pa.
3. *Tool Steels*, Catalog #41, Vanadium Alloy Steel Co., Pittsburgh, Pa.
4. *DieCarb—Grades, Application, Design and Maintenance*, Tech. Data 70-001, Firth Sterling Steel and Carbide Corp., Pittsburgh, Pa.
5. *Meehanite Metal*, Meehanite Research Institute of America, Inc., New Rochelle, N. Y.
6. *Ampco for Forming and Drawing Dies*, Bulletin 96, Ampco Metal Inc., Milwaukee, Wis.
7. *Carboloy Die Engineering Manual*, Carboloy Div., General Electric Co., Detroit, Mich.
8. *Timken Graphitic Tool Steels*, The Timken Roller Bearing Co., Canton, Ohio.

Piercing Die

A piercing punch and die for piercing holes in a sheet metal cup in two different planes at 90 degrees to each other is shown in the accompanying illustration. At the top is a cross section view of the die through the centerline. Below is a horizontal view.



The sheet metal cup is located in the piercing die 1 which contains the 20 holes to be pierced in the top of the cup and two holes to be pierced in the sides of the cup. When the press ram moves down the steel plate 2 comes in contact with the cup and holds it firmly during the piercing operation. The steel plate 2 is actuated by four coil springs 3. The two holes in the sides of the cup are pierced at the same time as the holes are punched in the top of the cup by two sliding punches 4. These two punches have a 30-degree angle surface and move in against the center of the die by means of two steel blocks 5 when these blocks come in contact with the punches.

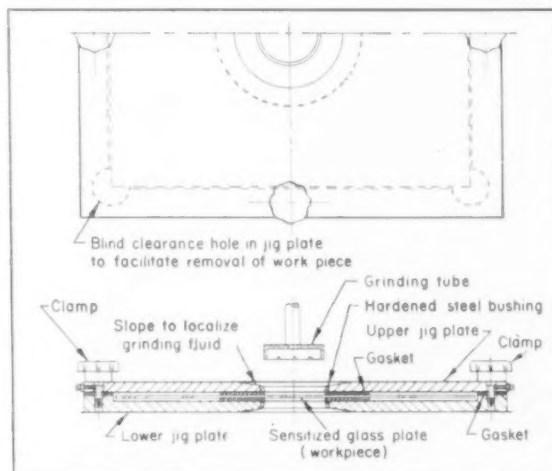
When the press ram moves upward, the sliding punches 4 are immediately moved back to their starting positions by the coil springs 6. The workpiece is shown at 7.

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Drilling Glass Plates

The problem, to which the solution is shown here, was to drill two-inch center holes in small quantity lots of 10 x 12 x 0.090-inch sensitized glass plates of the type used in the graphic arts industry for photographic purposes. First appearances indicated an extremely difficult operation, since any foreign matter such as carborundum or glass chips would damage the sensitized coating on the glass. The problem was further complicated by the necessity for performing the operation in a darkroom with only a safelight for vision.

After the possibility of drilling the glass prior to sensitizing had been ruled out, a jig was designed for the operation. The features of the jig are shown in the sketch.



Basically, the part was protected from handling, carborundum, glass chips, etc. by enclosing it in the jig during the drilling operation. Rubber gaskets were used to make the protection more complete.

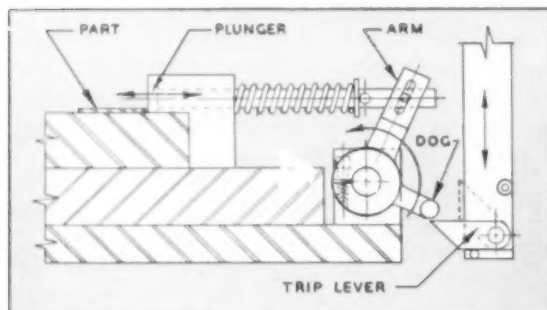
The jig was made from stainless steel and aluminum. It was possible to wash the whole device to remove foreign materials before opening the jig to remove the workpiece. Another feature of the jig permitted starting the hole from one side and completing it from the other, reducing the effects of breakthrough.

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Contributions for these pages describing short cuts for the tool engineer are welcome. Finished drawings are not necessary. Payment for accepted articles is made upon publication.

Part Ejector

In a pierce, cutoff and emboss die, it was necessary to feed the stock against a positive stop to insure accuracy. The part had to be removed from the die in a sidewise direction, and was not adaptable to removal by air blast. At the bottom of the press stroke, trip lever *B*, which is attached to the ram of the punch press, is at its down position, beneath dog *C*. Upon the up stroke of the press, dog *C* is lifted, rotating the shaft to which arm *D* is attached,

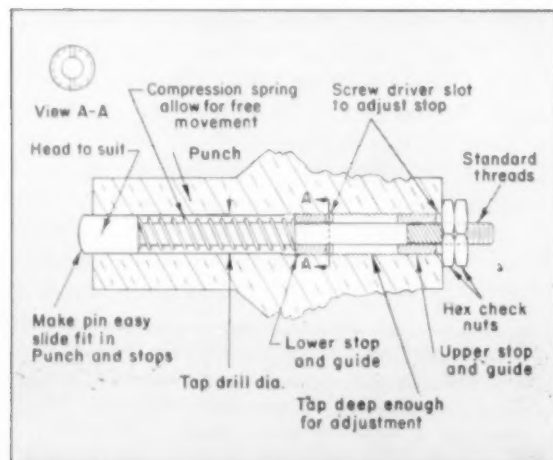


causing arm *D* to shove plunger *E* out, ejecting the part from the die. The spring on plunger *E* returns the plunger to its original position as the press ram continues upward, releasing dog *C* from trip *B*.

This device eliminates an operator behind the press to remove the parts.

Variable Pressure Pin

An infinitely variable knockout pin or pressure pad assembly is shown in the sketch here. The pin, check nuts, spring and movable stops are utilized intact for the full life of the punch and are then transferable to a replacement punch, eliminating unit manufacture and stock. Precision is not re-



quired because of the through hole in the punch and the flexibility of the design.

If an entirely closed unit is necessary, the check nuts may be of the spanner type and the pin length designed to afford contained action and maximum punch grind life.

Dimensions will be governed by the workpiece to be handled and the compactness required; spring compression should not exceed standard recommendations.

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Expanding Collet Mandrel

In machining parts for electric motors, collet mandrels are used because of the nature of the work. Some of these collets are very light and easily broken. They were made from steel, hardened and ground, and were expensive to produce. Experiment showed that a more satisfactory collet mandrel could



be made from grade G.A. mehanite iron bushing stock. The collets were machined inside and out to correct diameters in the same setup. Slots were cut on the miller for expansion, without any heat treatment. After three years of use, a mandrel such as shown in the figure carried no evidence of wear, no breakage or slippage.

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Contributions for these pages describing short cuts for the tool engineer are welcome. Finished drawings are not necessary. Payment for accepted articles is made upon publication.

Gaging Involute Splines

By Leon N. DeVos

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SPLINED PARTS are gaged to insure interchangeability by conformance to size specifications. This is accomplished by manufacturing parts to prints with complete and proper dimensions that specify an absolute control of fit with positive or negative backlash. Presented in this manner, the gaging of splines appears to be a task easily accomplished but this is not necessarily the case.

To avoid confusion and misunderstanding, which cause much expense and delay, product designers, tool engineers, quality control engineers, gage designers and inspectors must understand what affects splined connections and how the many variables can be controlled.

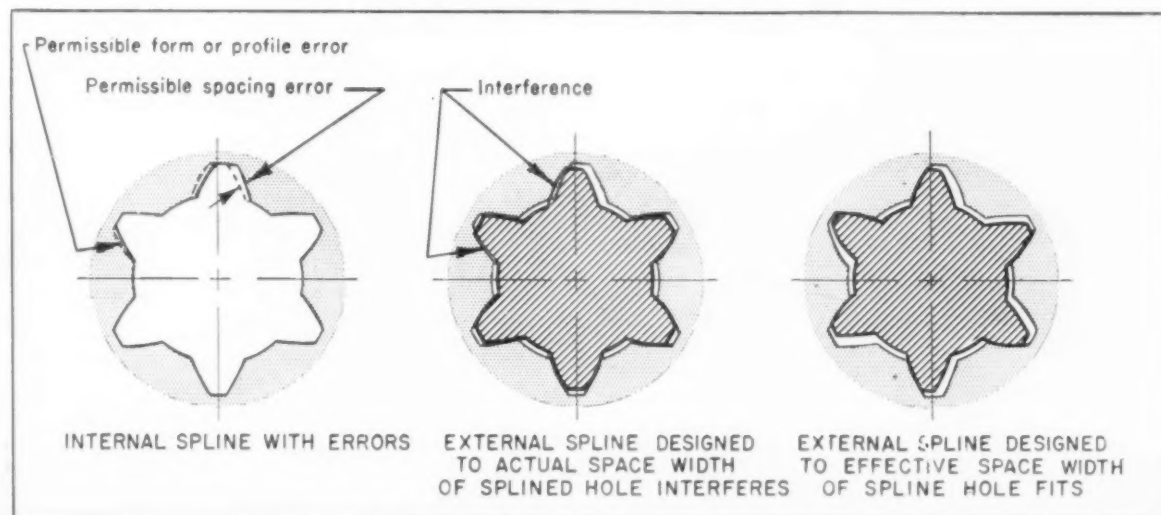
A workable spline standard is of great benefit. To fulfill this need, the 1950 revision of the *American Standard for Involute Splines*, ASA B5.15,

provides control of interference errors in splined parts. Vincor, recognizing the existence of these errors and designating them as "interference errors,"¹ established a practical method of spline control. This information was presented by A. S. Beam to the SAE and published in the *SAE Journal*, July, 1946. The terms, "effective" and "actual" were established and incorporated in the 1950 revision of the American Standard for Involute Splines. This standard, however, uses "dimensional" in place of "actual."

Upon completing the revision of the spline standard, the ASME committee for involute splines recommended the preparation of a spline gaging standard. The resultant *American Standard for Involute Spline and Serration Gages and Gaging*,

¹ This term does not appear in the present standards.

Fig. 1. Effect of interference on spline fit.



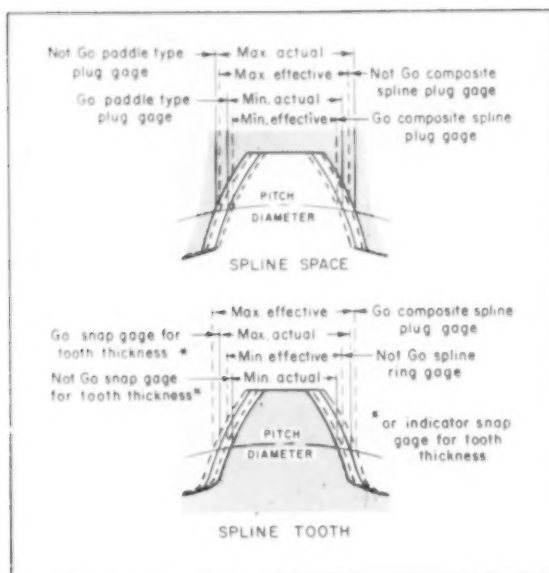


Fig. 2. Major dimensional factors and gage control.

soon to be published, provides a useful and much needed tool for spline production and inspection.

These two standards and the *Commercial Standard CS8-51*, which incorporates the standard blanks for involute spline gages, enable us to design and control splines with ease and assurance.²

How can this be accomplished? First it is necessary to understand the meaning of "interference errors," "error allowance" and the terms "effective" and "actual."

Interference errors are those manufacturing errors for which an allowance must be made, since they definitely affect the fit between mating splines. They are as follows:

- Accumulated pitch error (spacing)
- Profile or form error (involute)
- Lead error (lack of parallelism)
- Out of roundness

Error allowance³ is the total amount of these interference errors allowed to affect the spline fit. The magnitude of error allowance depends upon the application of the splined part. This allowance is usually 60 percent of the sum of the individual amount allowed for each interference error. (see *American Standard for Involute Splines*).

Interference errors have a definite effect on a spline fit. Fig. 1 illustrates the effect of interference errors—spacing and profile. The internal spline, with six spline spaces of equal width, has one space located incorrectly (spacing error), and another space has a profile error.

An external spline, theoretically perfect without spacing or form error, cannot enter the splined hole due to interference as indicated, although each tooth of the shaft is the same size as its mating space.

To allow the external spline to enter in any position, the thickness of all its teeth must be reduced by the amount of interference. It will then assemble with the internal spline. This same condition is true of the other allowable interference errors, lead error and out of roundness.

"Effective Space Width" of an internal spline is equal to the circular tooth thickness at the pitch circle of a theoretically perfect external spline, which would fit without freedom or interference.

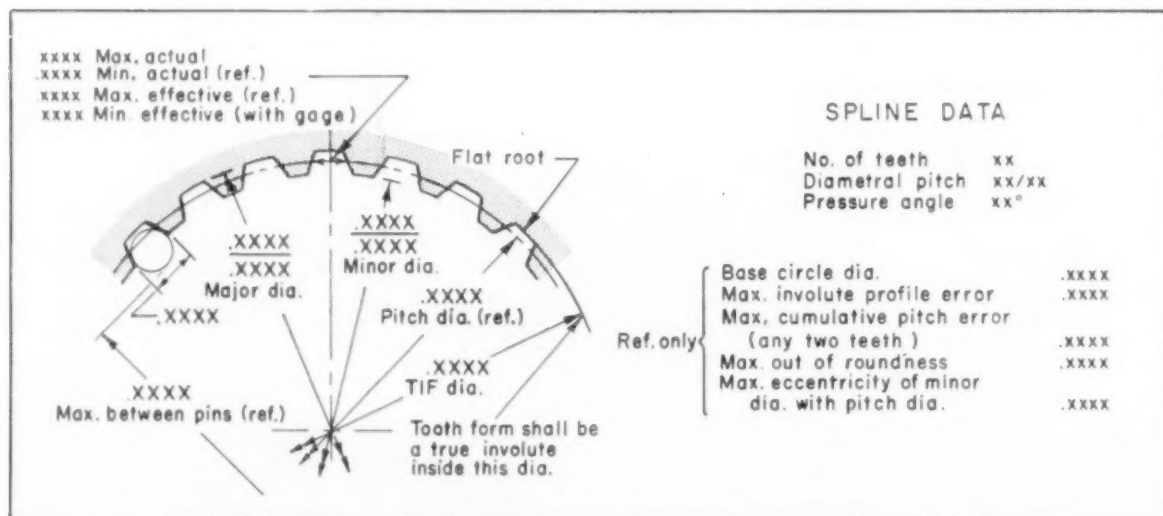
"Effective Tooth Thickness" of an external spline is equal to the circular space width at the pitch circle of a theoretically perfect internal spline which would fit without freedom or interference.

The specifications, effective space width for the internal spline and effective tooth thickness for the external spline, determine the fit of a splined connection (the maximum and minimum backlash).

² *American Standards—Involute Splines*, American Society of Mechanical Eng., 29 West 39th Street, New York 18, N. Y., and *Gage Blank Standards*—Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C.

³ This term does not appear in the present standards.

Fig. 3. Proper dimensioning for internal spline.



Leon DeVos, senior member ASTE Detroit chapter, has been intensely interested in spline gages and their practical application since starting with the Vinco Corp. as a draftsman in the engineering department twelve years ago. This interest, combined with a fine sense of things mechanical, has been responsible for his present position which takes him to all parts of the country setting up spline gaging programs or getting somebody out of hot water.



Properly designed gages control manufacturing operations and assure the proper fit.

In Fig. 2, the important dimensional factors of an internal spline and an external spline are illustrated. The gages used to control these factors are also listed.

Part Print: It is most important that the part print be dimensioned properly. Only then can the tool designer and the gage designer do their job correctly. Figs. 3 and 4 show internal and external splines with proper and complete dimensions.

Many specifications are marked "Reference." Such specifications are for use in analyzing the spline design, designing and setting up tools and designing gages. These reference specifications are not final inspection control dimensions. However, some are used to evaluate production problems or to control machining operations when gages are not available. The dimensions on the print and the manner in which they are shown specify exactly what is required for final inspection control.

EXAMPLES: The print for an internal spline gives the circular space width as follows:

.XXXX Max. Actual Space Width
.XXXX Min. Eff. Space Width

This indicates that final inspection should use a Not Go paddle plug gage and a Go composite plug gage. The part print could be dimensioned as follows with no change in inspection equipment:

.XXXX Max. Actual Space Width
.XXXX Min. Actual Space Width (Ref.)
.XXXX Max. Effective Space Width (Ref.)
.XXXX Min. Effective Space Width

If the Max. Effective Space Width were not marked Ref., a Not Go composite plug gage would be required, indicating a need for a close fit on backlash control. This will be discussed later. These same facts should hold true when dimensioning the external spline.

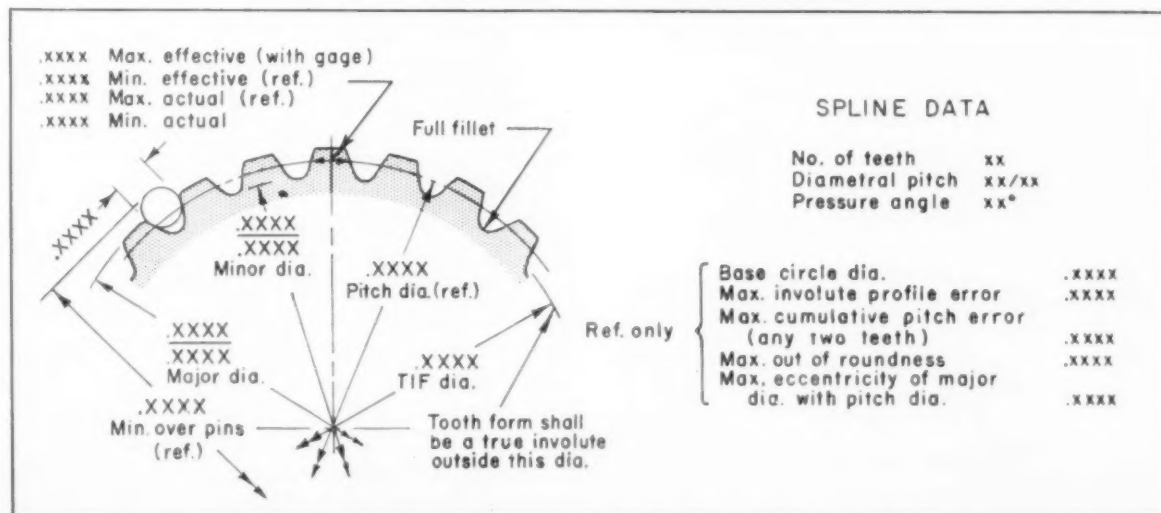
It must be emphasized that correct tool design, gage design and spline fit control are wholly dependent upon proper specifications on the part print.

What happens if the part print is not complete or if it is contradictory and confusing? Chaos and guesswork! The part print may specify a tooth thickness or space width with a tolerance, but may fail to indicate whether or not the error allowance is included in this tolerance.

The gage and tool designer may be able to proceed if he has prints of the mating parts together with the backlash specifications. Otherwise, the entire procedure becomes guesswork, unless it is possible to obtain clarifying data from the product designer.

Another example of a confusing part print is one where the tooth thickness or space width specifications do not agree with the dimensions over or between measuring wires. This should not be dismissed as a calculating error; it may have been a method of specifying effective and actual sizes

Fig. 4. Proper dimensioning for external spline.



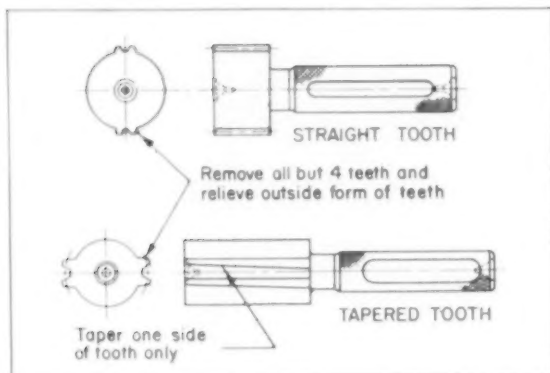


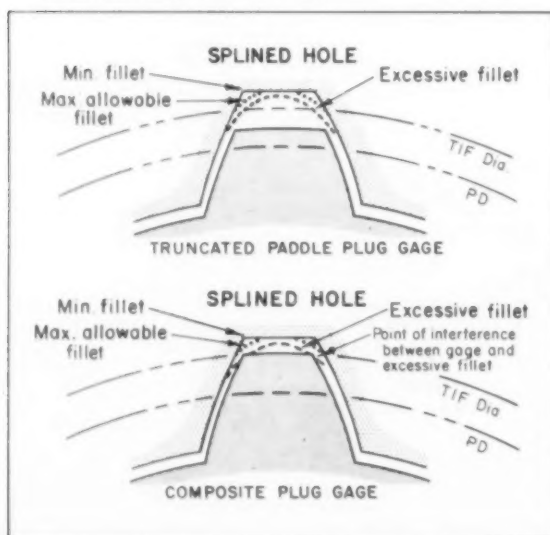
Fig. 5. Involute spline paddle type plug gages.

(dimension over or between wires as actual and the tooth thickness or space width as effective). The only recourse for the gage and tool designer is to contact the product engineer for clarification.

These and many other confusing conditions can be eliminated by the correct use of the available national standards. The product designer should look at the finished part print and ask himself, "Can I determine exactly the type of spline fit, tooth side or major diameter; also, what method of control is necessary to make this unit function satisfactorily?" If the answer to the first question is positive, he has made it possible for the gage and tool designer to furnish the tools and controls to produce a finished product that will meet specifications.

Gage Types: The *American Standard for Involute Spline Gages and Gaging* lists and describes all the important types of gages. The following descriptions and illustrations of the gages most generally used, will explain how splines can be controlled in the manner previously discussed.

Fig. 6. View of paddle gage truncation to illustrate inspection results.



PADDLE TYPE PLUG GAGES: Fig. 5 shows a paddle type plug gage used to control the actual space width of an internal spline. It performs an inspection similar to a between-wire check. A Not Go gage checks the maximum actual space width, a Go gage checks the minimum actual space width. The outer sides of the teeth, on this type of gage, are relieved so that only two most diametrically opposite spaces are in contact with the splined part. That permits the entrance of the gage regardless of accumulated interference errors.

The tapered tooth paddle plug gage is a combination Go and Not Go gage with scribed lines to show the control points. It is used on parts with close tolerances or where close size control is desired, so that parts can be selected within a given size range. Since the tapered tooth plug gage measures the actual space width of the splined part, rather than merely establishing its acceptability, it is often preferred over Not Go paddle plug gages. A series of tapered tooth plug gages may be required if the pitch diameter of the part is small and the space width tolerance is liberal.

Paddle type plug gages are truncated (major diameter reduced), Fig. 6, so that they are not affected by excessive fillets. Excessive fillets can be caused by worn or improperly designed tools. Should these fillets extend beyond allowable limits, the Go composite plug gage, which is not truncated, will not enter the work.

The Go paddle plug gage is used only to evaluate rejection by the Go composite plug gage or to aid in setting up production equipment. If the Go paddle plug gage enters the work and the Go composite plug gage rejects the part, it is an indication of excessive interference errors or an excessive fillet.

COMPOSITE GAGES: Designed to check simultaneously more than one dimension, composite gages are used to assure correct assembly with the mating part. They provide a means for checking the effective dimensions. A Go composite gage serves as an acceptance gage only; it does not disclose which dimension or relationship is incorrect. This gage will reject a part if any one of the functional dimensions causes interference, or if the individually acceptable dimensions are not in their proper relative positions.

A Not Go composite gage does not control single dimensions. It will enter, and thus reject the part, only if all dimensions are outside of the specifications. Even though all the dimensions are outside the specifications, the relative position of these dimensions may still prevent the Not Go composite from entering. Therefore, a part would be accepted by a Not Go composite gage even though all dimensions were outside specifications and the relative

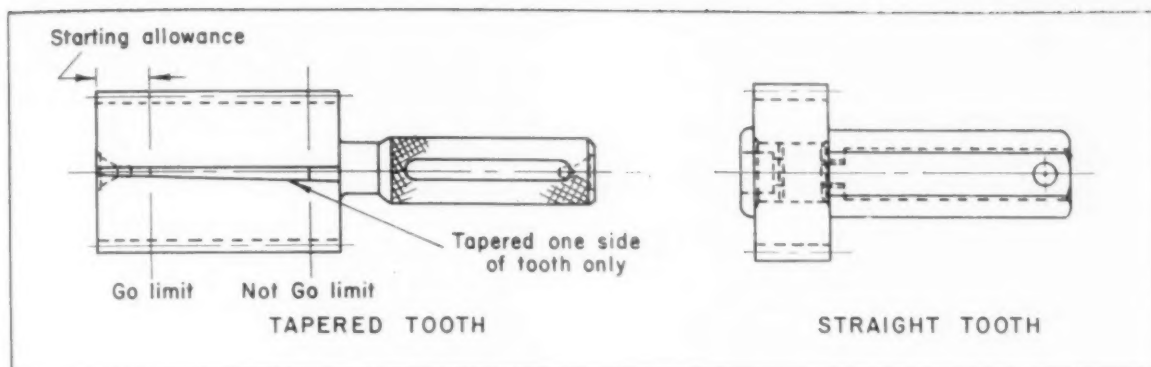


Fig. 7. Composite plug gages for internal splines.

locations of these dimensions were incorrect.

Two types of composite plug gages, straight and tapered, are shown in Fig. 7. These gages control the effective space width. The Go gage represents the male mating part and controls the minimum effective space width. The Not Go controls the maximum space width.

A Not Go gage is rarely required except where the control of the maximum backlash is very important. For example, it is conceivable that a condition may exist where the actual space width is near the high limit, and the interference errors are less than expected. This would result in the part being too good, allowing the assembly to have excessive backlash. The Not Go composite plug gage will control this condition.

The Not Go composite plug gage can replace the Not Go paddle plug when checking splined parts, such as those used in instruments where only backlash control is required and the magnitude of the contact area of mating splined parts, is of minor consequence.

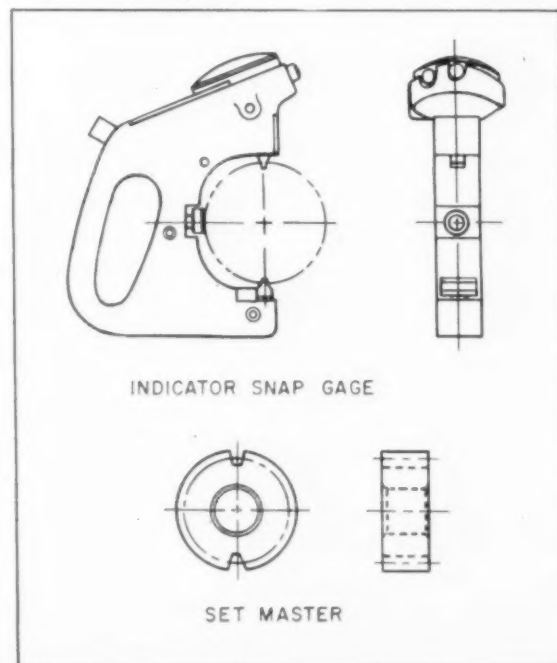
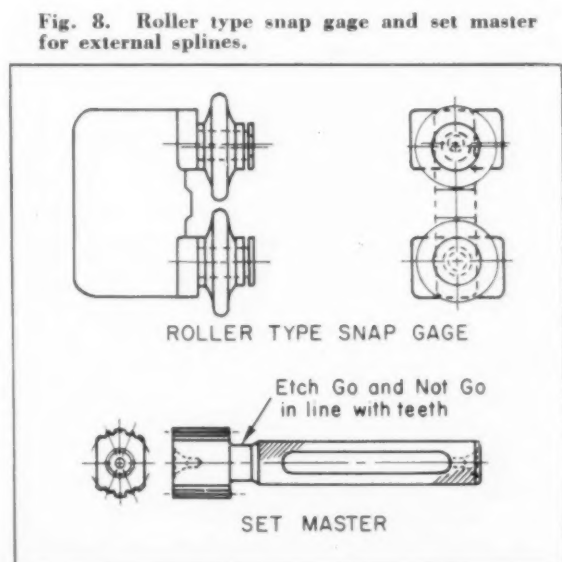
The tapered tooth composite plug gage is a combination Go and Not Go gage with scribed lines

to show the control points. It is used on parts with close tolerances and if desired, parts can be selected within a given size range. Since the tapered tooth gage measures the effective space width of the splined part, rather than merely establishing its acceptability, it is often preferred over separate Go and Not Go gages. A series of tapered tooth plug gages may be required if the pitch diameter of the part is small and the space width tolerance is liberal.

Having covered the fundamental gages for the internal spline, the fundamental gages for the external spline will be discussed.

SNAP GAGES: The roller type snap gage, Fig. 8, performs the same function on the splined shaft that the paddle plug performs in the splined hole. It controls the actual tooth thickness and achieves the same effect as an over wire check. The Go

Fig. 9. Indicator type snap gage and set master for external spline.



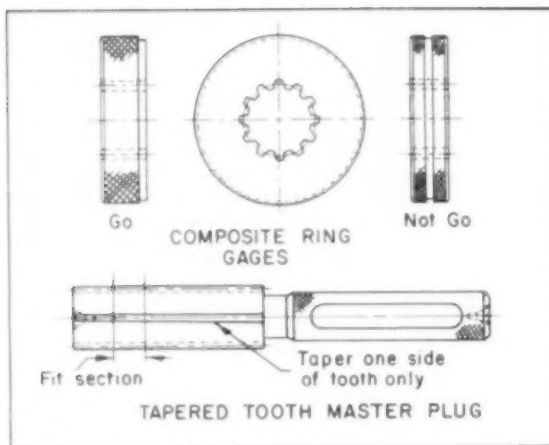


Fig. 10. (Above) Involute spline composite ring gages and tapered tooth master plug.

Fig. 11. (Below) Schematic representation of a splined connection.

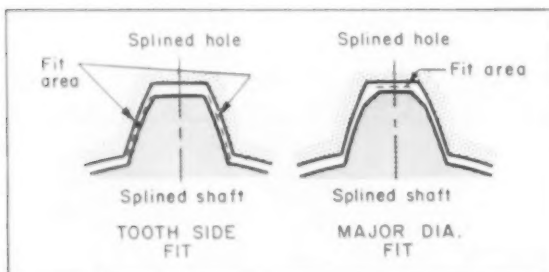
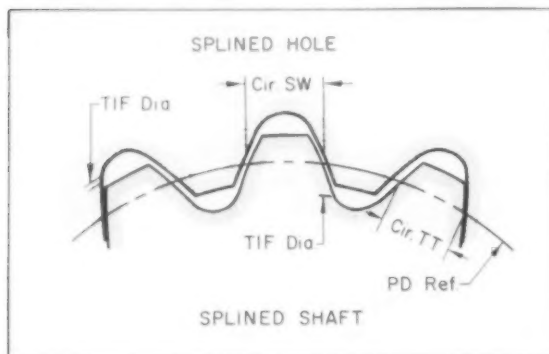
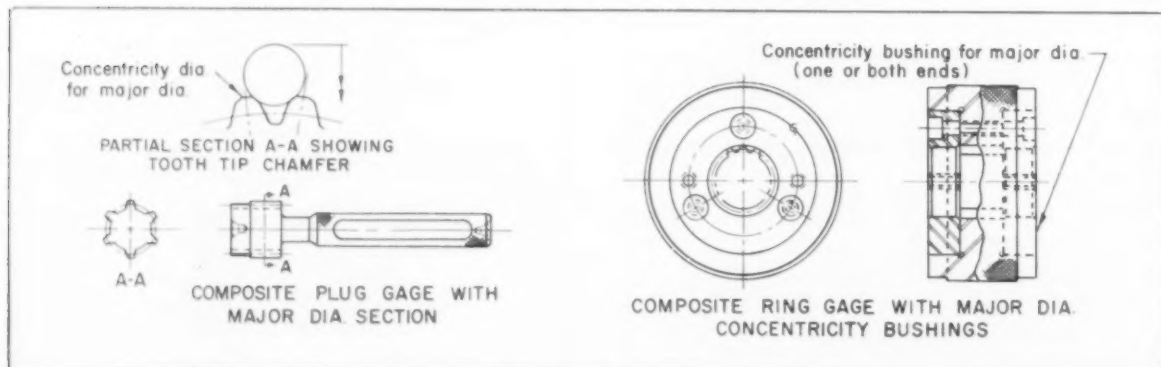


Fig. 12. (Above) Types to fit in common use in involute splines.

Fig. 13. Additional gages employed for major diameter fit.



roller type gage controls the maximum actual tooth thickness. The Not Go controls the minimum actual tooth thickness. These gages have an eccentric adjustment for initial settings and resettings necessary to compensate for wear. The settings are made to a set master which usually incorporates the Go and Not Go size.

When more comprehensive control is required, the dial indicator snap gage, Fig. 9, is recommended. Ideally suited for quality control use, this gage has a rack tooth, rack teeth or a cylindrical section on the top and bottom jaws. These are called anvils. The cylindrical section represents a measuring wire. The top jaw is movable and actuates a cushioned movement dial indicator, graduated in increments of 0.0001 inch.

The dial indicator snap gage provides a fast and efficient method of taking a measurement similar to an over wire check. The gage, after being set to a set master, provides a reading on the dial indicator that can be converted by a direct ratio to show the deviation between the tooth thickness of the part and tooth thickness of the set master. This ratio should be stamped on each gage, i.e., .XXXX inch on indicator equals .XXXX inch on tooth thickness. The set master can be made to provide a high, low or mean setting of any combination.

COMPOSITE RING GAGES: Shown in Fig. 10, the Go composite ring gage represents the mating female splined part and controls the maximum effective tooth thickness. The Not Go gage controls the minimum effective tooth thickness. It is rarely required except in case where extreme backlash or looseness control is needed. It is the counterpart of the Not Go composite plug gage used on the splined hole.

The tapered tooth master plug is used for accurate control of the ring gage. The ring gage is fitted to the master plug at the fit section. It is allowed some wear, usually 0.003 inch on space width. When it passes over the large end of a scribed line on the plug, the ring has worn beyond allowable limits and should be replaced.

The question is often asked: Why is a master plug recommended for controlling a ring gage, when a master ring is not recommended for controlling the plug gage? The answer is that all functional dimensions, including over wire size, spacing, lead, out of roundness and involute form, can be inspected on a plug gage. The inspection of these same dimensions on a ring gage presents many difficult problems. Thus, the practice of fitting rings to a master plug is more practical. In order to prove the acceptability of a master ring, it would, in most cases, be necessary to check it with a master plug. This could become a vicious circle.

The splined connection in Fig. 11 shows the elements that are controlled by the gages presented thus far. The actual circular space width and tooth thickness are controlled by the paddle type plug and snap gages. The composite gages control the effect of the allowable or interference errors, spacing, form, lead, and out of roundness, and the true form depth (true form diameter). The true involute form diameter is usually slightly beyond the possible extreme engagement of the mating part. This allows for eccentricity, and provides a safety margin.

The basic group of gages—plug, ring and snap—that are necessary for checking a splined connection using the tooth side fit, the most common type of fit, Fig. 12, have been discussed.

MAJOR DIAMETER CONCENTRICITY GAGES: When a major diameter fit is encountered, Fig. 12, gages and gaging elements for the inspection of critical fit diameters must be added to the basic group. Proper and complete dimensioning of fillets and chamfers is important for this type of fit.

On major diameter fits, it is necessary to control the concentricity between the major diameter and the pitch diameter of the splined connection. This is generally accomplished by using major diameter concentricity gages, Fig. 13, since they are capable of determining the acceptability of the part. Standard composition plug and ring gages are sometimes used in addition to concentricity gages to determine the cause for rejection, which might be either the effective size of the spline or eccentricity of the major diameter as related to the spline.

These gages are effective in spotting production problems caused by faulty or worn tools, poor set-up or worn machines. For example, it is conceivable that a part

will accept the Go snap gage, and the Not Go snap gage may show indications of starting on the part, but the Go composite ring gage will not accept the part. This is a positive indication that either the interference errors are greater than print specifications allow or the ring gage is hanging up on an excessive fillet.

Fit Control: A typical chart that lists the factors involved in the fit control of splined connections is shown in Table 1. It includes part specifications, gage tool numbers and sizes, tools such as broaches, hobs, cutters, etc., and their identification numbers. Included also is the important fit information such as minimum and maximum major diameter clearance, minimum and maximum backlash, and all other important spline data. Space is provided for listing "green gages" which may be needed for part control before heat treatment or a final operation such as grinding. There is a section provided where any unusual information pertaining to a particular connection can be listed. Charts of this nature can be used as a "central source of information" on any spline program.

Inasmuch as each manufacturer generally has an individual gaging problem, he should not get the impression that the gages discussed will handle all situations nor that all the gages shown are needed for every spline gaging program. It is hoped that this article will clear up some of the existing confusion and misunderstanding and that it will be easier to solve the problem of properly gaging splined parts.

Table 1—Typical Involute Spline Control Chart

MACHINES TOOLS	PART SPECS	GREEN GAGES	TYPE	FINISH GAGES	INVOLUTE SPLINE	REMARKS
SPLINED HOLE PART NO. 67471	MAX ACTUAL SPACE WIDTH .0810	TOOL NO. TOOTH THICKNESS	NOT GO PADDLE PLUG	TOOL NO. G-11 TOOTH THICKNESS .0810	TYPE OF FIT FLAT ROOT SIDE MAJOR DIA CLEARANCE MAX .029 MIN .014 BACKLASH MAX .0061 MIN .0005 MINOR DIA CLEARANCE MAX .0265 MIN .014	ONLY SPLINES WITH BROACH TOOL TEAR MARKS ARE LAPPED
	MIN ACTUAL SPACE WIDTH .0800	TOOL NO. TOOTH THICKNESS	GO PADDLE PLUG	TOOL NO. G-12 TOOTH THICKNESS .0795		
	MAX EFFECTIVE SPACE WIDTH .0795	TOOL NO. TOOTH THICKNESS	NOT GO COMPOSITE PLUG	TOOL NO. TOOTH THICKNESS		
	MIN EFFECTIVE SPACE WIDTH .0785	TOOL NO. TOOTH THICKNESS HIGH LOW	TAPERED TOOTH COMPOSITE PLUG	TOOL NO. TOOTH THICKNESS HIGH LOW .0800 .0785		
		TOOL NO. TOOTH THICKNESS	GO COMPOSITE PLUG	TOOL NO. G-10 TOOTH THICKNESS .0785		
SPLINED SHAFT PART NO. 67432	MAX ACTUAL TOOTH THICKNESS .0764	SNAP GAGE NO. G-15 SET MASTER NO. G-16 T.T. .0814	GO SNAP GAGE AND SET MASTER	SNAP GAGE NO. G-10 SET MASTER NO. G-11 T.T. .0764	SPLINE DATA NO OF TEETH 12 PITCH 20/40 PA 30° PITCH DIA .6000	VINCO CORP. SPLINED CONNECTION CHART PARTS 67471 67432
	MIN ACTUAL TOOTH THICKNESS .0749	SNAP GAGE NO. G-19 MASTER NO. G-20 T.T. .0799	NOT GO SNAP GAGE AND SET MASTER	SNAP GAGE NO. G-14 MASTER NO. G-11 T.T. .0749		
	MAX EFFECTIVE TOOTH THICKNESS .0780	RING GAGE NO. G-17 MASTER NO. G-18 T.T. .0827 W.L. .0830	GO RING GAGE AND TAPERED TOOTH MASTER	RING GAGE NO. G-12 MASTER NO. G-13 T.T. .0777 W.L. .0780		
	MIN EFFECTIVE TOOTH THICKNESS .0765	RING GAGE NO. MASTER NO. T.T. W.L.	NOT GO RING GAGE AND TAPERED TOOTH MASTER	RING GAGE NO. MASTER NO. T.T. W.L.		
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Automation of Machine Tools

Part II--

Control Applications

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New York City

PRINCIPLES OF CONTROL for the automation of machine tools was presented last month in Part I of this article. This second part contains a description of some of the more interesting applications of the latest techniques of information storage and feedback to the control of machine tools.

Automatic Noncircular Gear Shaper: This machine is unique in that it can produce masters or production gears with equal ease at the rate of 25 per eight-hour day. *Fig. 8.* The setup time is the time required to insert the gear cutter, fasten the gear blank and thread a strip movie film tape into a 16-mm projector. A start push button initiates the operation and the machine stops automatically when the job is done.

A little background on the history of this automatic machine tool provides a picture on how the need for machines like these may arise in industry.

Arma Corp., in its program for the development and production of T-41 range finders for U. S. Army tanks, required on short-delivery basis, small quantities of accurate noncircular gears. The only possible source was a subcontractor having a gear shaper with a copying attachment. Such machines were scarce and the small production would hardly justify the machine tool investment. Even then, the time consumed in waiting for a toolmaker's master was objectionable. Too, the small-quantity production would hardly justify a master, except that with the existing facilities there was no other way.

Dr. F. W. Cunningham of the Arma Corp. envisioned another way—adapt a standard gear shaper, with feedback controls, to make gears from a programmed tape order. That was done, almost

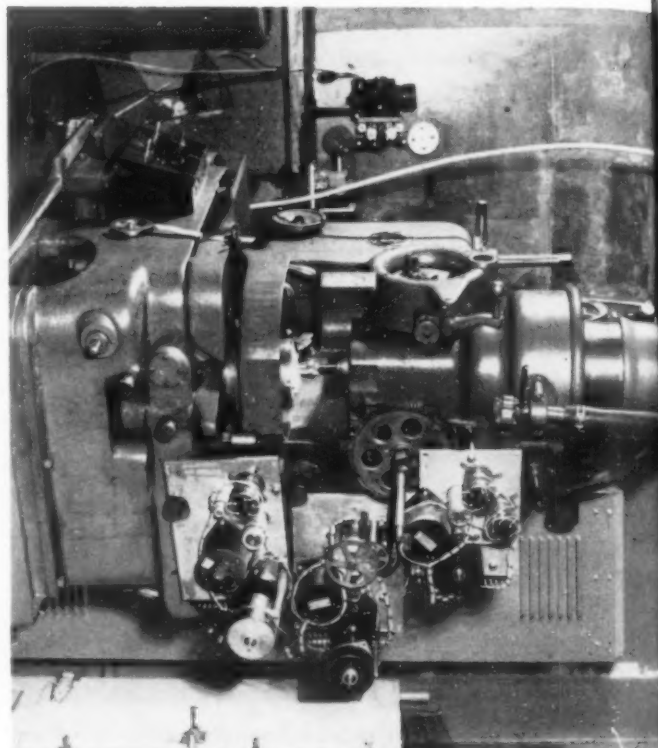


Fig. 8. Servo-adapted gear shaper for cutting noncircular gears.

completely, with standard brain block components, surplus parts from the last war. In a sense, Dr. Cunningham's gear shaper makes a gear of master accuracy every time because it is slaved directly to specifications written in the language of the tape. Typical gear sets cut by this machine are shown in *Fig. 9.*

A Fellows No. 72 gear shaper was chosen for adaptation. The three basic motions of the shaper, rotation of the work, rotation of the cutter and

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work-cutter center distance, were quickly fitted with servomechanism drives in jury-rig fashion. Used were 60-cycle brain block components: synchro control transformer, induction generator, 2-phase servo motor and an electronic servo amplifier.

In the generating method employed by this shaper, the pinion-type cutter is effectively rolled along the pitch line of the gear. This is accomplished by rotating the cutter and gear at the proper relative and varying speeds, simultaneously adjusting the cutter-work center distance. The motions of the gear shaper's three servomechanisms are directed from orders originating on a motion picture film tape.

Data for constructing this tape is calculated for as many discrete points along the curve of the gear as considered necessary for each of the three motions of the machine. The differences between points are determined and a linear interpolation is used to establish the spacing of fixed incremental orders. These orders are put on motion picture film by photographing the flashes of a row of four lights.

Computing of this data takes about 100 hours. Putting these values on the film takes about four hours. Seventy-five percent or more of these hours are now in process of elimination. A computing instrument which Dr. Cunningham is now designing is calculated to enable the preparation of all data input in a fraction of this time.

Once the necessary data is put on the film, it is projected continuously on a row of photoelectric tubes. From these photoelectric tubes the signals are carried to relays through amplifier tubes, which increase their strength. The relays operate ratchet mechanisms which rotate synchro-generators. The synchro-generators then control the angular position of the cutter, the work and the distance between their centers through the gear shaper's servo-mechanism drives. In this manner the gear is generated from the blank.

The design approach used in the noncircular gear shaper would appear to offer great hope for relatively inexpensive, flexible automation for medium quantity production of accurate parts of moderate size and complex contour.

Automatic Lathe: A standard engine lathe was adapted several years ago by Arma Corp. for automatic control from a punched paper tape. Due to commitments in the field of military controls, this prototype equipment could not be followed up for the interesting automation possibilities that became evident.

The lathe was fitted with longitudinal feed, transverse feed, turret position and spindle speed servomechanisms for automatic control. Tachometer generators were used for damping in the positional servomechanisms. It was thus possible to achieve velocity control by cutting out the positional response element and bucking the tachometer with a

suitable feed rate signal. Complete programming was afforded from the punched paper tape which ordered appropriate feed rates, positional settings, tapers, contours, etc. A photograph of the lathe is shown in Fig. 10.

Punching the tape from a drawing for a typical workpiece required about 15 minutes. Such a piece could be cut in the lathe in about four minutes compared to about 30 minutes required by a competent machinist. Tolerances could be maintained to 0.0003 inch.

The punched tape was read by electrical contact fingers, closing circuits through the contacting drum in accordance with the configuration of punched holes. A combination of fingers and holes established an accurate decimal order signal voltage to the appropriate follow-up servomechanism.

Backlash between tool post and power lead screw was, in effect, eliminated with a linear transducer cooperating with a second spring-loaded lead screw. Any backlash was measured by the linear transducer and fed back into the null circuit of the servomechanism, which then automatically cancelled it out.

Automatic machine tools, such as the automatic lathe, require of their servomechanism drives a different kind of operation than is required in many military equipments. For example, speed control must be continuous and not stepped in synchronizing. In a cutting operation, overshoots cannot be tolerated. Also, position control must be smooth and continuous.

Automatic Milling Machine: As another example of how a standard machine tool can be adapted for automatic control from a punched tape, a milling machine was adapted at Massachusetts Institute of Technology under the direction of Prof. William Pease.

This work was done under contract with the U. S. Air Force Air Material Command.³⁸ Manufacture of airplane parts is, for the most part, in the medium production class. This fact, together with the need for rapid delivery of parts of complex shape, further emphasizes the need for automation.

Although the basic approach in automating this machine is somewhat similar to those already described, some of the differences are significant. Of particular interest are the information storage and data handling means, referred to as the director.

The director is composed of three boxes tied in tandem: the data input system, the data-interpreting system and a group of three decoding servomechanisms. Included in the data input system is a tape reader similar to the electrical finger type unit used in the automatic lathe and a pair of relay registers for each axis of machine motion. The registers resemble the registers used in certain automatic dial

*Numbers refer to references listed at the end of the article.



Fig. 9. Noncircular gear sets cut by servo-adapted gear shaper.

telephone systems for storing dial pulses. Tape pulses are memorized in the register by actuating the appropriate relays, and at the end of the pulse train, the block of information is instantly transferred to the second register in the pair. This register then passes out orders as rapidly as the data interpreting system can handle them.

The data-interpreting system employs digital computer techniques in converting the binary-coded register data to accurate decimal pulse orders for setting up the decoding servomechanisms. Pulse generation is done by an electronic oscillator also acting in the role of a master timing device for the system.

In order to prevent errors due to the possible loss of pulses, a closed-loop system is used to convert the digital pulse decimal machine order to the analog or physical displacement form required by the milling machine. This is done by the decoding servomechanism, which uses a unit called a coder as the feedback element. The coder is geared to the transmitting synchro generator and provides one feedback pulse for each degree of synchro rotation. This sum of feedback pulses is compared with the sum of input pulses from the data interpreting system in a summing register which acts as an error measuring device. A voltage, proportional to the

algebraic pulse difference, is produced by the summing register and is applied as an error signal to the decoding servomechanism. The decoding servos thus perform as digital-to-analog converters to repeat machine orders to the machine-control power servos.

The machine motions under control are vertical motion of the cutting-tool head, cross-slide motion of the cutting tool and transverse motion of the table on which the work is mounted. Power drive is through a lead screw for each axis. Separate instrument racks are provided for measuring output motion with synchro control transformers. The smallest incremental order of machine motion in this system is 0.0005 inch. Over-all accuracy capability is approximately 0.001 inch.

In this system the tape is prepared after the desired contour of the work is broken down into elements of straight line segments. The incremental distance between the end points of the line is coded on the tape in binary fashion for each axis. Binary coding permits 'short-hand' storage of large amounts of information in a small space. Electronic digital computer equipment is required to handle the binary operations. It is estimated that approximately 10 feet of tape is sufficient to store information to operate the MIT machine for one hour. The feed rate in this system is provided automatically by specifying the time for each straight line segment of the cutting operation. This, too, is coded on the tape.

Separate Control of Cutting Speed: The machines described operate from tapes charged with digital orders of the decimal or binary coded type. By means of the magnetic tape recording techniques, described earlier, information may be handled directly in analog form. Regardless of the form of the original tape order, it would appear desirable to be able to separately control the speed of cutting, possibly from a tape order played back on a separate channel. This would enable the coordinates of a contour to be initially recorded or played in from a master machine at any speed. Cutting the same contour on different materials or of variable cross-section would merely require the empirical statement, on tape, of the instantaneous speed required. The tape order, thus recorded, could then directly control a tape velocity servo. This feature is incorporated in the system shown in Fig. 11.

In this system it is desired to cut contours of any shape without a master and without a pantograph type linkage system. The drive uses a rectangular coordinate system. Separately driven x and y lead screws position a single chuck holding a suitable cutting tool or flame cutter. The work is mounted on a stationary table. A response potentiometer furnishes a voltage which is an exact measure of the drive position with respect to a baseline. If this voltage opposes a calibrated order voltage in the null

circuit of the servo, the drive will automatically adjust itself to the ordered position.

The order may be derived from some device like a piano-roll punched tape or a magnetic tape. On this tape, the simultaneous x and y coordinates of the desired contour are recorded in two rows. These quantities produce on a decimal basis accurate voltages which order the respective drives to the proper point on the contour. A system like this lends itself naturally to scale change by merely scaling the voltage excitation of the response potentiometer.

In some types of contouring, it is important to maintain a constant cutting speed along the locus. In flame cutting this would be important to prevent burning of the workpiece. This may be done by calculating the tape speed at each point on the locus and then recording this order on the tape accordingly. This method is somewhat time-consuming and laborious. The following method will do the same thing automatically, *Fig. 12*.

Voltages corresponding to the instantaneous speeds of the x and y carriages of the cutting tool are applied to the primary coils of a resolver. These voltages are supplied from the damping tachometers on the carriage drives. The resolver null voltage, strengthened by the amplifier, drives the a-c servo motor to maintain an accurate null. Wound on the secondary of the resolver is a coil whose axis is perpendicular to the null coil. This coil, therefore, picks up a voltage proportional to the vector sum of the x and y speeds, i.e., the instantaneous peripheral speed. If this voltage, measuring the actual peripheral speed is bucked against a voltage re-

presenting the speed desired, and the difference voltage is used to actuate the tape drive motor, the drive mechanism will automatically adjust its speed to maintain a null at the input to the tape motor amplifier. Such a null can only be achieved when the instantaneous combination of x and y carriage speeds produces the peripheral speed ordered. This speed order may be taped if a continuous predetermined variation is required.

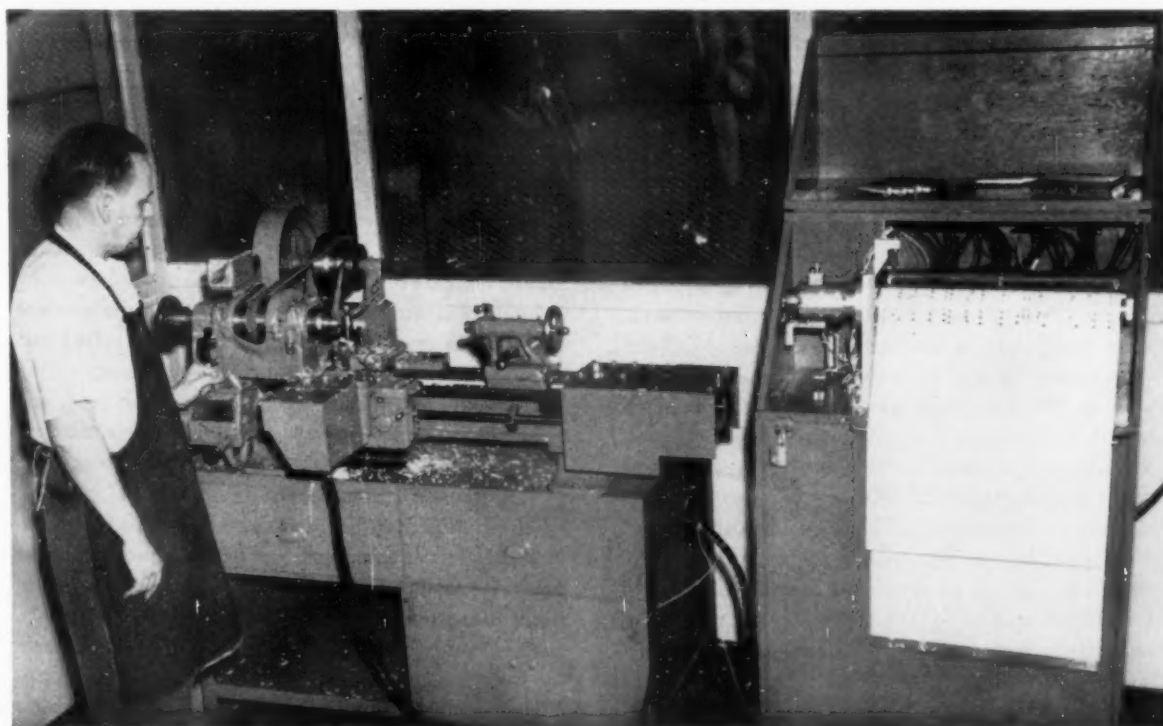
This example illustrates how simply analog computer technique may be utilized in schemes for flexible automation. Methods such as these might also be adapted for use where it is desirable to employ automatic tracer devices.

High Efficiency Cutting: One aspect of metal-cutting which deserves serious consideration is the efficient removal of metal from a piece of work. Consider a wide-gap lathe, for example, where a large cylindrical workpiece is to be turned down in certain sections to a much smaller diameter.

If the spindle were to be driven at a constant rpm, the lineal cutting speed at the surface of the work would be a maximum at the start and would decrease directly with the radius. This surface speed variation would be objectionable for two reasons: machining time would be increased, and optimum metal-cutting speed would occur only at the start.

With a closed-loop speed control system as shown in *Fig. 13*, it is a simple matter to achieve a constant lineal cutting speed. A potentiometer is geared to the cross slide so that it produces a voltage inversely proportional to the radius of the workpiece or its

Fig. 10. Automatic lathe control, prototype unit.



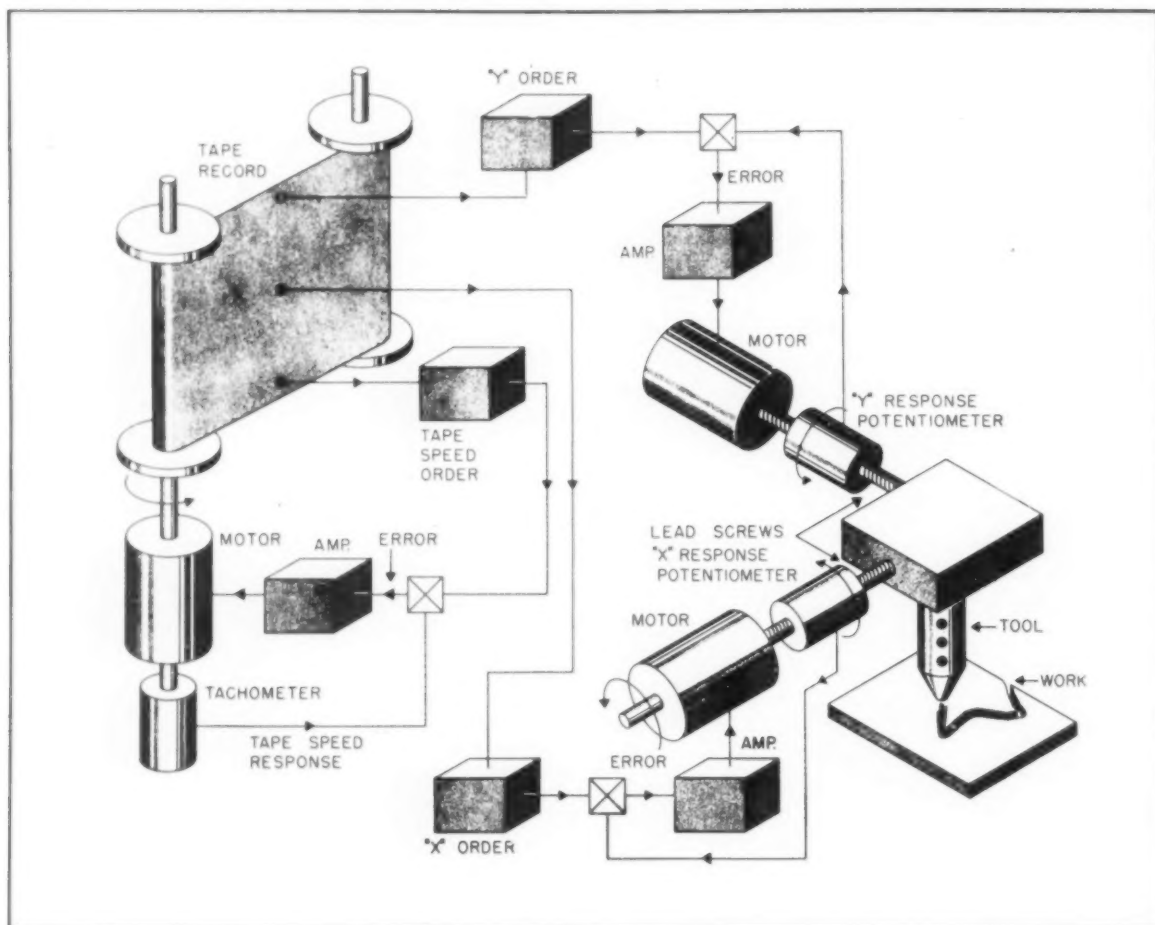


Fig. 11. Automatic contour cutting system.

equivalent, the cross-slide motion. This voltage is used as an order to the spindle-drive servo. The rotational speed of the work is thus increased as its radius decreases and a constant surface cutting speed is maintained.

In this application the servo is acting in two important roles: as an equation solver, and as an automatic drive, maintaining the correct spindle speed as ordered by the cross-slide potentiometer. This type of drive would be applicable in a variety of problems such as winding machines or rolling mills.

Another aspect of efficient metal-cutting is to remove metal at the maximum desirable horsepower. In the lathe cited, a wattmeter could be connected to the spindle motor to provide a voltage proportional to the instantaneous horsepower drawn. If this voltage is bucked against a reference voltage, indicating the desired cutting horsepower, in the null circuit of a servomechanism supplying cross-slide motion, the cross slide will automatically adjust the tool feed-in rate to regulate the spindle motor's horsepower consumption at the correct value. For the constant spindle speed lathe control discussed here, spindle power is proportional to motor torque. Thus, a torque transducer would suffice as a measurement of horsepower.

Approach to Automation

It has been shown how the modern techniques of feedback control and information handling can provide greater flexibility in machine tool automation. This is achieved through separation of brains and brawn in the controlled operation. Precisely calibrated, single-purpose drive equipment, characteristic of open-loop control is eliminated. In its place is substituted a muscle device in the form of a reasonably sensitive controller requiring no accurate calibration, and a brain unit attachment, comprising small, low-power, interchangeable brain block components. Information, stored in some suitable tape memory, is directed to the feedback controlled machine via information handling equipment.

Normally a new part means a change in tape, and production need wait only for the time required to translate the part specification into tape language. Where drastic changes require alteration in basic machine tool response, it might be necessary to interchange the brain blocks. For example, synchros might be replaced with resolvers or induction potentiometers, stock items for automation.

This approach would seem to offer a sound basis for automating existing industrial machinery. Capital investment would be preserved, greater machine

tool efficiency would accrue and a considerable experience would be obtained in the effective use of automation. Further, such automatic machinery could still be used manually if desired. In addition, there is no reason why an automated machine could not operate from a tracer as well as a tape. Tapes have been stressed here because of their greater flexibility; accurate three-dimensional tracing is complicated and requires precisely scaled models.

Although the methods discussed would appear to offer the greatest promise for the fields of medium production, improvements in mass-production manufacturing should not be overlooked. Consider what might be done toward improving the flexibility of the automatic screw machine. This machine, presently programmed by cams, could be controlled by tape-actuated servos. A production order for a new part would require a new tape to be made and inserted into the programmer. This would be quicker than machining new cams. Tapes and brain blocks do not wear out as cams do. Cam wear may introduce significant errors in long production runs. The magnetic recording and playback system described earlier provides for extremely rapid tape preparation. Setup time would become negligibly short. In place of tape programming, a photoelectric tracer might be used with cam outline drawings.

The techniques of closed-loop control have been emphasized. It is important, however, that specific problems of factory automation be approached with an open mind. The open-loop approach may be the most practical and inexpensive, particularly

for standard single-purpose operations. Where a self-checking versatile system of high accuracy is required, the closed-loop approach is in order.

A closed-loop system may become dynamically unstable as characterized by oscillations or continuous hunting. The enclosure within the loop of several energy storage elements, such as long springy shafts and heavy inertias, may make the problem of damping oscillations almost untenable. It might be wiser, in certain cases, to omit certain elements from the loop and then relying partially on the accuracy of open-loop scaling. It should be understood there is open-loop scaling in all feedback systems in the input and response transducers.

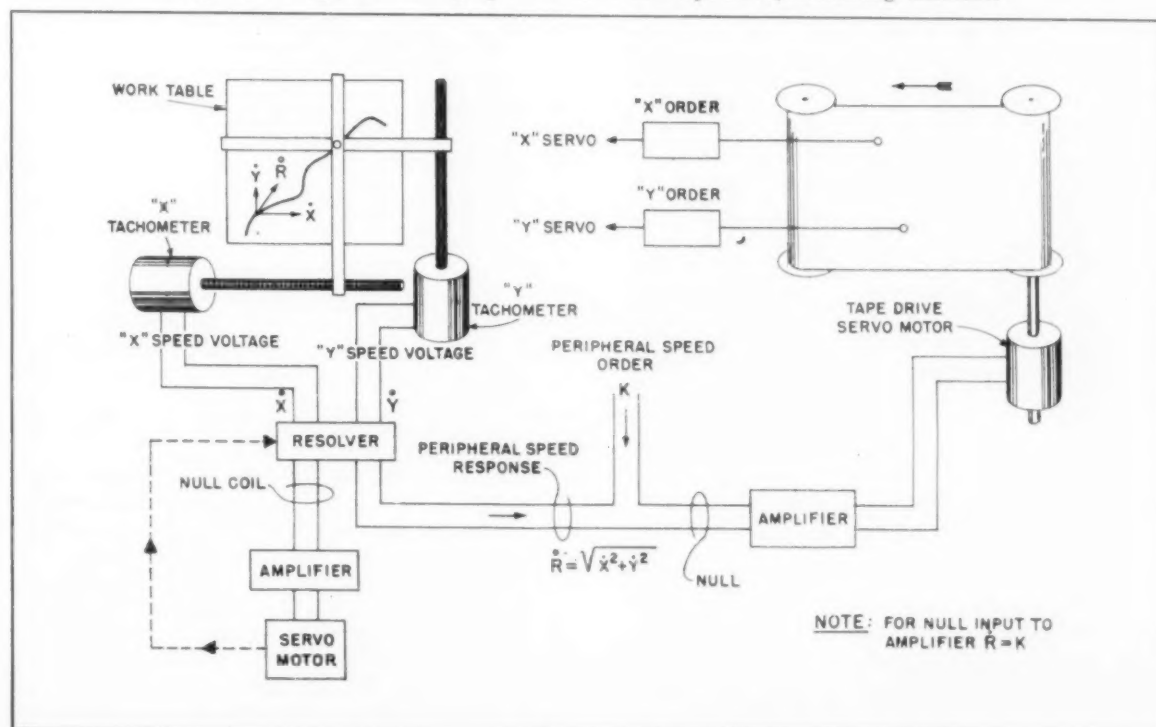
There are other aspects of discrete unit factory automation that may be even more challenging. For example, machine loading and unloading, tool change and materials handling.

There is much that could be done to flexibly automate these categories. Closely analogous problems have already been solved in connection with classified governmental projects. There is thus a basis for confidence in being able to handle the individualized problems in the automatic factory.

It is important that factory automation not be approached in piecemeal fashion. A systematic approach must be adopted to achieve a set of objectives. What might these objectives be? Several typical ones are:

1. Minimize stock piling.
2. Distribute materials and parts adequately to eliminate shortages.
3. Prevent bottlenecks.

Fig. 12. Peripheral cutting speed control for tape-drive, contouring machine.



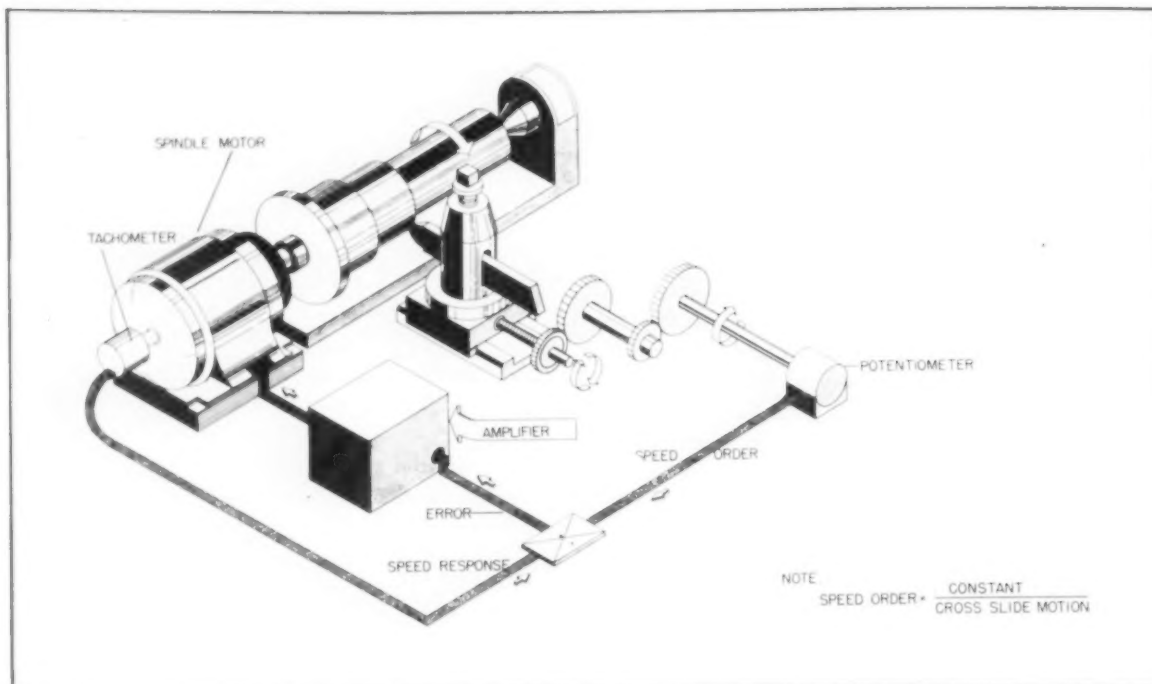


Fig. 13. Spindle-drive servomechanism for constant-speed surface cutting.

4. Maximize machine use time.
5. Minimize rejections, rework and scrap.
6. Reduce materials handling and work transfer.
7. Operate machines at highest efficiency of tools.
8. Provide smooth and rapid transition to new type production.

These objectives can be met in a factory that provides flexible flow of its discrete unit production. This is not easy for an ordinary factory, least of all the automatic factory. The production control department in a present-day factory is responsible for coordinating the efforts of man and machine and guiding the flow of material through production to completed product. In an automatic factory, this production control responsibility must be built into an automatic control system. Such a system must be capable of self-supervision and self-correction. This means that the framework or philosophical base for the automatic factory is closed-loop or feedback control.

Master schedules, operation sheets, duties of the foreman, machinist, crane operator, inspector, dispatcher—all these must be coded in the language of automatic control, stored in memory devices and programmed in a manner that will interwork responsive robots in the automatic factory. It is here where the digital computer, as a logical sequence control device, should prove most valuable. The computer, stored with a sequence of questions and correct answers, would automatically direct operations and check the fed back response. Errors would be followed by corrective orders; trouble would be followed by orders for parallel path operation and alarm signals. This is the kind of thing

that goes on in an automatic dial telephone exchange, an automatic factory for telephone calls.

By centralizing master controls and programming devices through the use of an adequate switching system, specialized equipment could be minimized, yet adequately handling the production traffic. Ease of maintenance also would accrue and, at the same time reduce the complexity of the individualized machine tools.

There is undoubtedly a considerable gap between the completely automatic factory of the future and present-day factories, comprising people and machines. To what extent and when the human element can or should be eliminated in setting up an automatic factory is a complex problem. The proper blend of formal engineering, human engineering and economics should be employed to best meet the required long or short term objectives.

References*

1. A. E. Javitz, "Magnetic Recording System in Production Design," *Electrical Manufacturing*, Feb. 1950.
2. E. W. Leaver, et al Patent No. 2, 475, 245, July 15, 1949, U. S. Patent Office.
3. *A Numerically Controlled Milling Machine*, Final Report to the U.S. Air Force on Construction and Initial Operation. Servomechanism Laboratory, Massachusetts Institute of Technology.
4. "Problems Involved in Magnetic Tape Recording" by Norman E. Gibbs, *Proceedings of Electronic Computer Symposium*, Los Angeles, Calif. April and May, 1952.

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SPECIAL GAGING

for High-Precision Production

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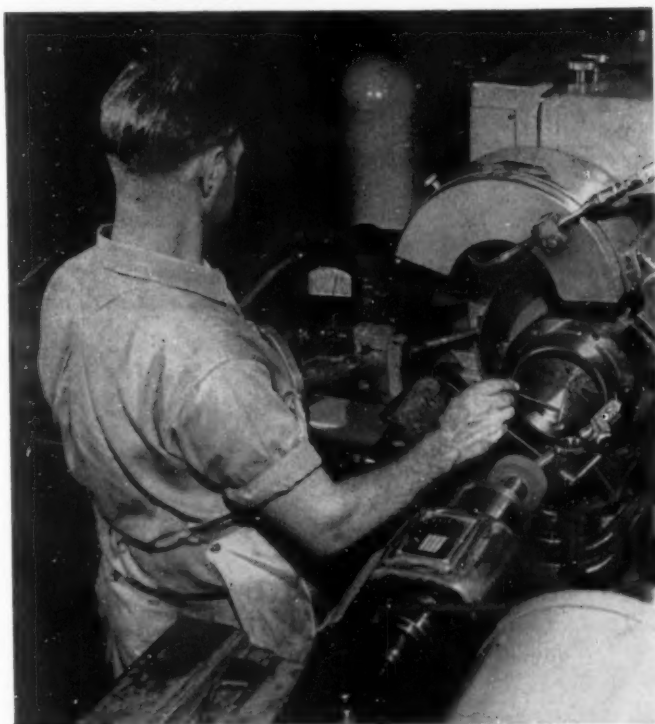
UNUSUAL ACCURACY is required in the manufacture of super precision tapered roller bearings for machine tool spindles, special equipment and other precision applications. To hold assembled bearings to the maximum permissible runout of 0.000075 inch, the component parts must be produced within a tolerance of 0.000025 inch on concentricity and other measurements. This extreme precision is attained on a production basis at The Timken Roller Bearing Co. plant in New Philadelphia, Ohio.

To hold the assembled bearings within the required tolerances, the ID's of the races are ground with the part held on a rotary magnetic chuck, the OD being centered within 0.000020-inch runout. Centering is done by hand, *Fig. 1*. The inner or outer race is set up with the chuck at partial holding power. After centering by eye with the chuck rotating at about 70 rpm, the operator brings the tip of an electronic indicator head in contact with the OD and moves the indicator stand until the amplifier meter reads on scale.

Watching the meter on the nearby amplifier, the operator lightly taps the edge of the rotating work-piece with a soft brass rod to adjust its position until it runs true within a movement of about two divisions on the meter scale. This is done with the amplifier at low sensitivity, centering the piece within 0.0002 inch.

Next, the amplifier scale selector knob is turned to the upper or high-sensitivity position. The meter then reads 0.000010 inch per division. The rotating race is given a final light tapping required to reduce the runout to 0.000020 inch or less as shown by the movement of the meter hand (two divisions or less). Full power is then applied to the

Fig. 1. Centering a bearing cone on a magnetic chuck for grinding the ID.



chuck and the ID is ground in the usual way.

At first it might seem difficult and time-consuming to center any part by hand to an accuracy of 20 millionths runout. Actually, inexperienced operators learn the knack in a week or two, and can then complete the centering operation in a minute or less. So far as is known there is no other method which is able to provide the required accuracy on a production basis.

Inspection of Races: About 30 percent of the finished inner and outer races are spot-checked on the special spindle-and-chuck unit shown in Fig. 2. Using the same method, the operator centers the parts on the magnetic chuck until the OD runs true within 0.000020 inch. The indicator is then used (1) on the ID to check concentricity; (2) on the end face and on the shoulder face of the cone to check for parallelism with the face that is seated on the chuck; and (3) at two points on the taper, as near as possible to the inner and outer ends, to compare the runout at both points and thus to check the "squareness" of the taper with the end face of the race. Concentricity, parallelism and squareness must be within 0.000025 inch.

Grinding and Gaging Rollers: The rollers are finish-ground on centerless grinders equipped with

Fig. 2. Inspection setup for checking geometry of finish-ground races. Indicator is checking the parallelism of face of shoulder with respect to the end face.



special fixtures to provide the proper taper and are checked by the grinding machine operator on nearby reciprocating gaging fixtures which were designed and built by Timken, using a Cleveland Instrument Co. gage head and amplifier. The roller is placed in the fixture which slowly moves the roller back and forth beneath the contact tip of the gage head, Fig. 3. The anvil of the gaging fixture is at the same angle as the taper of the roller. Thus, when the taper is perfect, there is no movement of the gage head as the roller passes beneath it.

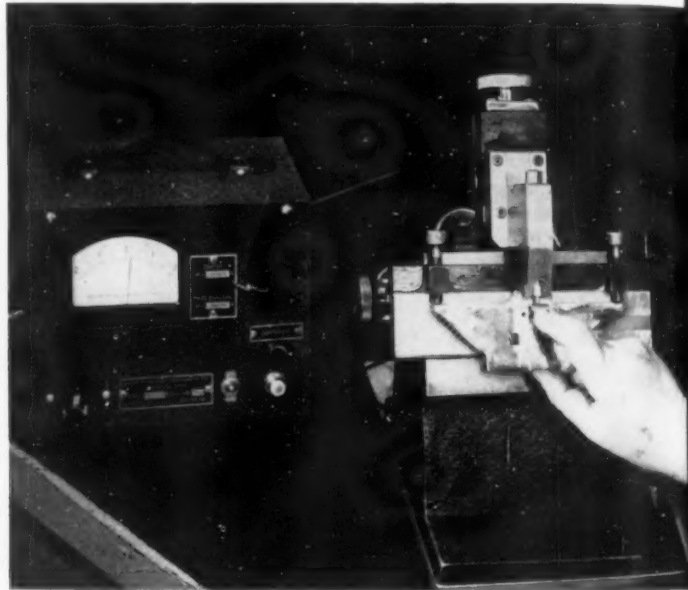
With this equipment, the rollers are checked simultaneously for taper and for size. In addition, the operator gives the roller two or three partial

turns while gaging, so that any out-of-round condition will be disclosed. Concentricity is held within 0.000025 inch, and variation in taper is held within .000020 inch from end to end.

Rollers as well as the races are given 100 percent final inspection, using the same types of equipment as for production inspection. All rollers of a given nominal size are sorted for diameter in increments of 0.000020 inch; all rollers for a given bearing assembly are taken from the same size group.

Inspection of Assembled Bearings: For final inspection, the assembled bearing is axially loaded with a weight, Fig. 4, and checked for flatness or parallelism by rotating the bearing with the tip of a gage head contacting the top of the outer race with the cone stationary. It is then checked for run-

Fig. 3. Checking roller for taper, diameter and concentricity. The reciprocating fixture moves roller axially beneath the contact tip. Deviations are shown by the meter.



out by rotating the outer race with the OD in contact with the tip of a second gage head. Maximum permissible deviation in each case is 0.000075 inch, or $7\frac{1}{2}$ divisions on the meter scale with the amplifier at high sensitivity.

Except for management and supervision, the operation is staffed entirely by personnel who have had little or no previous production experience. In spite of the exceptionally close tolerances required in all operations, there has been no difficulty in producing the work. The setup procedures, though unusual in some respects, are essentially simple. The operations are straightforward and the electronic gaging equipment is easy to use.



Fig. 1. Aluminum aircraft mounts entering and leaving automatic adhesive applicator and drying conveyor.

Bonding Rubber to Metal

Design and Production Problems

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NOT TOO MANY YEARS ago only natural rubber could be bonded to steel or cast iron, and then somewhat on a hit-or-miss basis. Aluminum presented bonding problems that almost eliminated integral rubber-aluminum products from the realm of practical manufacture. Today almost all alloys or basic metals can be bonded to either natural or synthetic rubber with strengths sufficient to satisfy practically all operational requirements.

Obtaining a satisfactory bond is only the first consideration because the further requirement of producing it readily in quantity on a consistent basis is equally important. The problem becomes more complex since many parts by nature of their design cannot be inspected or tested for adhesion. The producer and customer must place complete dependence on the uniformity of the adhesion process and on spot check quality control procedures.

The two basic types of adhesion methods in use today for obtaining bonds between uncured rubber and metal are chemical and mechanical. In both

methods actual adhesion between the rubber and metal takes place while the product is in the mold being formed and cured under 300-350 F temperature and 2,500 to 10,000 psi cavity pressures.

Chemical adhesion develops through the attraction of atoms or molecules capable of forming a stable compound themselves. Many rubber companies use a carefully controlled brass plate as a covering on metals to provide a method of obtaining adhesion to rubber. The brass plate method is classified as a chemical bond because during the curing cycle the brass plate reacts with certain ingredients of the compounded rubbers to form another chemical composition at the surface of the metal, providing a strong bond between the rubber and the metal. This method has wide usage in the rubber industry and is highly recommended as the most consistent and dependable means of obtaining satisfactory bonds which will withstand a wide variation of operating conditions.

The mechanical type of adhesion is so named because there is no chemical change in the adhering surfaces. In this process the special cements used penetrate the surfaces to be joined and, upon hard-

Abstracted from paper 21T13, "Bonding Methods for Adhering Rubber to Metal," presented at the 21st ASTE Annual Meeting. Copies of the complete paper will be available from the Society Headquarters.

Table 1—Application Data for Bonding Rubber to Metal
(Based on Strip Test)

	Natural Rubber		GRS Rubber		Buna-N Rubber		Neoprene Rubber	
	Bond Strength (lb./in.)	Adhesion Method	Bond Strength (lb./in.)	Adhesion Method	Bond Strength (lb./in.)	Adhesion Method	Bond Strength (lb./in.)	Adhesion Method
SAE 1010, 1020 Steel	90	A-1	70	A-1*	50	B-4	70	A-1 or B-2*
Hardened Steel	50	B-1	40	B-2	30	B-4	40	A-2 or B-2
Malleable Iron	60	B-5	50	B-2	40	B-5	50	B-1
Cast Steel	75	A-2	60	A-2	40	B-5	40	A-2 or B-2
Cast Iron	40	B-1	30	B-2	30	B-5	30	B-1
Type 303 Stainless Steel	70	B-5	60	B-3	...	...	50	B-4
Brass	80	A-1	60	A-1	20	D-1	30	B-4
Aluminum Sheet	50	B-1	40	B-2	20	D-1	30	B-4
Aluminum Castings	40	B-1	30	B-2	20	D-1	30	B-4
Carbon	50	C-1	30	C-1	...	...	...	...
Magnesium	40	B-5	30	B-5	...	...	...	...
Titanium	50	B-5	40	B-5	...	...	...	...

A—Brass plate type adhesion (chemical)
B—Chlorinated rubber type adhesive

C—Cyclized rubber type adhesive
D—Phenolic resin type adhesive

* (suffix number denotes variation of basic adhesive.)

ening, form the bond between the rubber and metal.

Manufacturing processes must be carefully controlled. The adhesive is brushed, sprayed, or dipped on the metal, *Fig. 1*, after it has been carefully cleaned. The age, viscosity, and general condition of the adhesive is critical and must be controlled. The application and drying of the adhesive must also be regulated carefully. Many adhesives are unstable in humid air and must be covered immediately with a more stable rubber cement.

In addition to adhesives applied to the metal or rubber, there are special cases where successful adhesions can be accomplished by chemically treating one or both of the surfaces. An example is the treatment of brass valve stems with isocyanate and persulfates to bond them to butyl synthetic rubber in the production of tire tubes.

The mechanical type bonds require the greatest variety of adhesives and manufacturing techniques. They have been developed for different combinations of natural or synthetic rubber and for metals not adaptable to brass plating.

Basic Mechanical Adhesives

Chlorinated Polymers: These are formed from various polymers by chlorination of the material in solution. One of the original adhesives in the field of mechanical bonds was a resin made by chlorinating natural rubber. Later, similar special usage adhesives were made by chlorinating various synthetic rubbers. Generally, this type of adhesive is the workhorse in the field, providing adhesives that adhere to many types of natural and synthetic rubber and to ferrous and nonferrous metals.

Rubber Resins: This class of adhesives is

formed in a manner similar to that of synthetic rubber. As a result of copolymerization, a class of special resins is formed for special usages.

Cyclized Rubbers: These materials are formed by the cyclization of natural or synthetic rubbers by means of tin tetrachloride or similar materials.

Phenolic Resins: This class of materials is comprised of phenol formaldehyde complexes. These adhesives are useful for obtaining bonds between Buna N type synthetic rubber and metal or plastic.

Types of Rubbers

Natural Rubber: This is a polyisoprene for which the exact chemical structure is in question. It is characterized by high resilience, high tensile strength, and high abrasion resistance, but is subject to deterioration by oils and sunlight. The major uses of natural rubber are for vibration dampers, engine mountings, and other highly functional parts.

GRS: This is an abbreviation for Government Reserve Synthetic. A copolymer of butadiene and styrene in various proportions, GRS has been the high production synthetic rubber. Though not the best in physical properties of the synthetics, it was chosen as the preferred synthetic because of the availability of materials used in its production. It is characterized by a medium degree of tensile strength, low oil resistance, poor elongation, poor flex life, and fairly good abrasion properties. A few of the major uses have been in tires, rolls, belts, and diaphragms. A recent development of "cold GRS" has resulted in an improvement in many of the physical characteristics.

Neoprene: This polychloroprene, modified with other ingredients such as styrene, comes closest in

physical properties to natural rubber. It is characterized by high tensile strength, good elongation, moderate resistance to oil and flame, and excellent resistance to sunlight. As a class, neoprenes have rather poor cold resistance but a few, such as neoprene FR, have good low-temperature properties. In molded-to metal products neoprene is used for shaft seals, outside decorative parts, electric motor mountings where oil is present, and other applications.

Buna N: Chemically, this is a copolymer of butadiene and acrylonitrile. With a high degree of oil resistance, medium physical properties, and good heat and cold resistance, buna N is used in parts where a high degree of oil resistance is required.

Butyl Rubber: Chemically, this polyisobutylene has the outstanding property of very low permeability to gases. The use of butyl rubber in tire inner tubes is well known. It is also used in molded rubber products for diaphragms and valves.

Silicone Rubbers: These are organo-silicon-oxide polymers. The most outstanding characteristic of silicone rubbers is their high heat stability and resistance. While natural and synthetic rubbers perform satisfactorily only at temperatures below 250 F, silicone rubber has been used successfully at temperatures from minus 100 F to over 500 F. Some disadvantages are its high cost compared to natural and synthetic rubbers, low tear resistance, and low physical properties. One of its wide uses has been for high-temperature gaskets and seals.

Application Methods Summarized

The wide variations in the application of adhesives to various combinations of rubber and metal are indicated in TABLE 1. Since there are at least five different types of chlorinated rubber type adhesives, several different phenolic type cements, and two different brass plate compositions in use, TABLE 1 refers to the different chemical variations in a class by a suffix number in the last column. In addition to

the variation in basic adhesion processes, there also are widely different methods of preparing the metal not shown by the table.

Control of Quality in Production

Three methods of evaluating adhesions are widely used throughout the industry.

ASTM Button Tension Pull Method—ASTM D429-47T: For this test a 1.59-inch diameter by $\frac{1}{2}$ -inch thick cylinder of rubber is bonded between two $\frac{3}{8}$ inch thick circular steel plates. A steadily increasing direct tension pull load is applied to the two plates to test the bond strength. While this method is used widely, it tends to give exaggerated adhesion strength values.

Strip Test ASTM429-47T-B: In this test a strip of rubber one inch wide, 8 inches long and $\frac{1}{4}$ inch thick is pulled from the metal to which it is bonded. The rubber is cut at the bond until enough is free to grip, and then the pull on the rubber is maintained 90 degrees from the metal. This type of test gives a better evaluation of the true bond strength but, since the pulling force is applied effectively at a one-inch wide line, the pull test values are much lower than for the direct-tension button test.

Destruction Pull Test: The third method of checking adhesion is by destruction pull tests on actual parts, Fig. 2. A common production procedure is to conduct quality control spot checks daily on functional parts such as engine mounts.

In some instances, where extremely high adhesion values are required and the design of the part lends itself to such an operation, production parts are 100 percent pull tested to a given load, Fig. 3, to screen out pieces with inadequate bond strength. This is a costly operation, and under certain conditions does not eliminate questionable bonds which may pass the 100 percent static test but fail in actual use. For the average well-designed part, a quality control spot check is adequate if the adhesion methods

Fig. 2. Destruction-pull test on automobile engine mount.

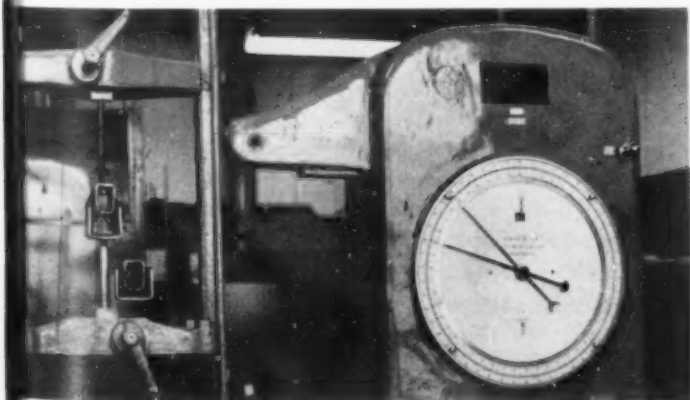


Fig. 3. Nondestructive adhesion test of engine mounts is made on the production run.

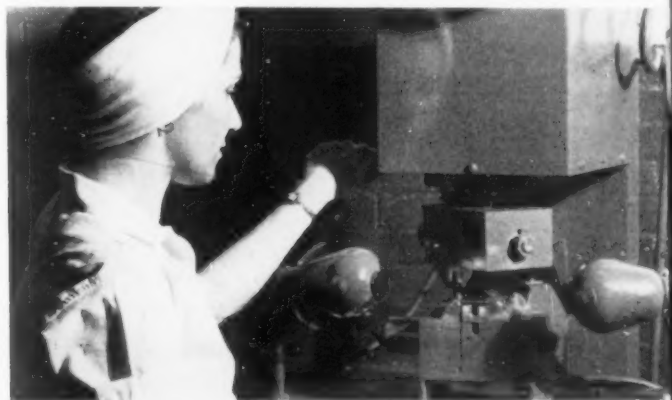


Table 2—Adhesion Values for Various Surface Conditions

Surface Condition of steel	Relative Adhesion Value (percent)
Control grit blasted surface	100
Finely polished surface	147
Hammered finish	97
Small longitudinal corrugations	86
Large longitudinal corrugations	70
Small transverse corrugations	63
Large transverse corrugations	59

are proved consistent and adequate. This is often true for engine mountings and vibration dampers, using natural rubber and steel stampings, where flex life is an important requirement and 100 percent adhesion testing is not practical.

In production, quality control methods of random sampling are often used but, if adhesion results are unpredictably erratic, even close control methods will not assure 100 percent satisfactory parts. Adhesion methods and manufacturing techniques must be used which best lend themselves to consistent results. The ultimate may be sacrificed for a lower average bond strength if results prove more uniform and predictable.

Design Considerations

The condition of the metal surface has a direct effect on adhesion values. The data shown in TABLE 2 are a tabulation of a laboratory test of bond strengths obtained with various types of surfaces of the same steel with the same rubber and metal preparation. The specimens were subjected to shear loading. The control grit blasted surface is listed as the 100 percent value.

These results show conclusively that corrugations used to increase adhesion area not only fail to improve bond strengths, but actually decrease them. The best type of adhesion surface is finely polished and continuous, but such refinement is generally unnecessary. Finishes produced by smooth rolling, drawing, machining, and grinding are satisfactory provided that slag inclusions, pits, folds, seams, and burrs are avoided. Smooth cast or gouged surfaces are acceptable also if no protruding sprues, flash fins, pits, porosity, and other surface defects are

Fig. 6. Designs *a* and *b* without edge radii are redesigned in *c* and *d* with adequate fillets.

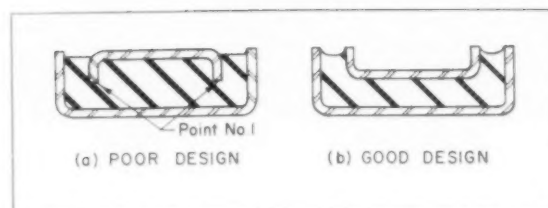
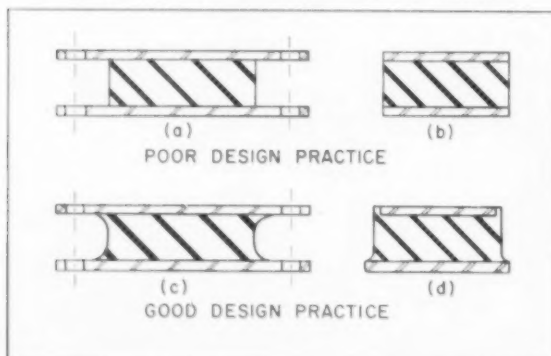


Fig. 7. Design *a* would build up stress concentrations at arrow points. Redesign *b* avoids this objection.

present. Generally it is necessary to sand blast or pickle adhesion surfaces to remove rust or scale.

If the part is a functional part which in operation is loaded in shear or tension, the part must be designed with a factor of safety for the bond. While bond strengths of 250 psi can be maintained consistently in the design of mild steel parts, it is desirable to incorporate adequate adhesion area so that under maximum dynamic load the bond is not stressed in excess of 125 psi. This gives a safety factor of two to one under the worst conditions. Space limitations at times prevent this but, wherever possible, the bond stress should be kept low. Tension mountings are infrequently used because the characteristics of rubber in tension are poor. A small nick in a rubber fiber tends to progress and cause the entire mounting to fail. When materials other than mild steel are used, the difference in adhesion values should be taken into consideration.

On shear and compression mountings, liberal fillets should be provided at the edge junction points, Fig. 4. Mountings *a* and *b*, lacking adequate edge radii, are poorly designed from viewpoint of edge effects. In *c* and *d*, the same mountings are redesigned with fillets to relieve edge stress. Mount *d* is preferred for production rather than *c* since the part without undercut would be easier and more economical to mold. Strictly from a performance standpoint, however, *c* would be preferred.

Edge radii are especially important on shear mountings. Test results show that mounts with edge radii may run as much as 50 percent longer on fatigue tests than those without.

Stress concentrations indicated by arrows in Fig. 5a should be avoided wherever possible in product design. The high stress concentration at Point No. 1, Fig. 5a, may cause failure of the mount along the adhesion surface even though the bond is good. A design to accomplish the same purpose without objectionable stress concentration appears in Fig. 5b.

Rubber-to-metal adhesion values of 250 psi can be expected under normal manufacturing conditions. Adhesion values of 500-1000 psi (direct-tension button test) can be obtained but these figures should not be used as expected bond strengths when designing for production. In fact, laboratory testing specifications should be established on basis of the strip test rather than on straight pull test.



JET ENGINE

parts produced in record time

By John W. Greve

STARTING FROM SCRATCH and with tremendous handicaps, the management of the Bridgeport-Lycoming Division of Avco Manufacturing Corp. has succeeded in establishing production records. In this plant, five major jet engine components are being produced in quantity to meet the General Electric J47 jet program. Production has already been reached for one component where cutbacks have been ordered by the prime contractor. All this has taken place in a period of 1½ years.

When the Stratford plant of Chance Vought was occupied in March, 1951, Lycoming acquired buildings but no machines. Yet production was started within a period of three months after receiving the subcontract for engine parts. To meet this ambitious schedule, it was necessary to improvise. Few new standard machine tools could be purchased in time and specials were definitely out of the question.

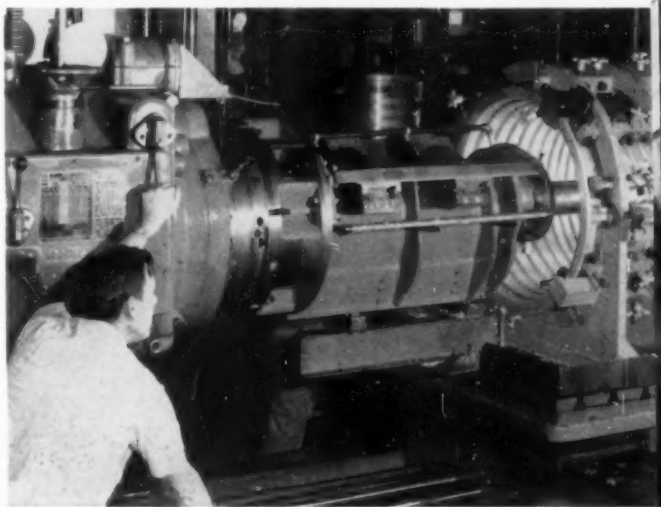
Instead it was necessary to adapt many tools supplied by USAF from war surplus depots, purchase rebuilt machine tools and buy many foreign machines. The company turned to foreign markets because American made tools were not available for immediate delivery.

A machinery repair department was set up to rebuild the worn-out machines and replace the many missing parts. In addition to the major prob-

lems of tooling, the power supply to the plant was inadequate and required increasing the feeder system from 6500 to more than 30,000 kva. Also, in a tight labor market, skilled labor was critically short, necessitating training a large percentage of the skilled personnel required.

The five major jet components consist of the inlet guide vane, the turbine wheel and shaft, the front frame (including the gear box), the com-

Fig. 1. Rough machining compressor stator case on a horizontal boring mill.



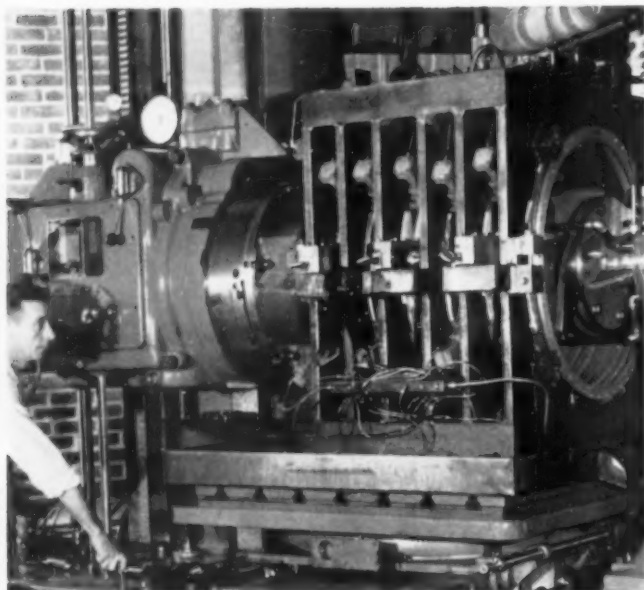


Fig. 2. Finish machining compressor stator case. Cat's head tooling and fixture with hydraulic pads have made possible considerably higher production rates than previously possible.

pressor stator, and the compressor rotor. These parts are assembled with other parts by the prime contractor to make the J-47 jet engine, power plant of such well-known Air Force planes as the North American F-86 "Saberjet" and the Boeing B-47 "Stratojet."

At present, the plant is operating at two-thirds of peak capacity on guide vane production. This is remarkable considering all phases of the problems met in tooling and operator training. Production of the front frame assemblies has increased to the point where it has been cut back by the prime contractor to balance inventory.

In addition to the jet engine parts, this plant

builds the R-1820 Wright Cyclone 9-cylinder radial engine as a prime contractor. The first radial engine manufactured in this plant was completed in March 1952, only twelve months after acquiring the plant.

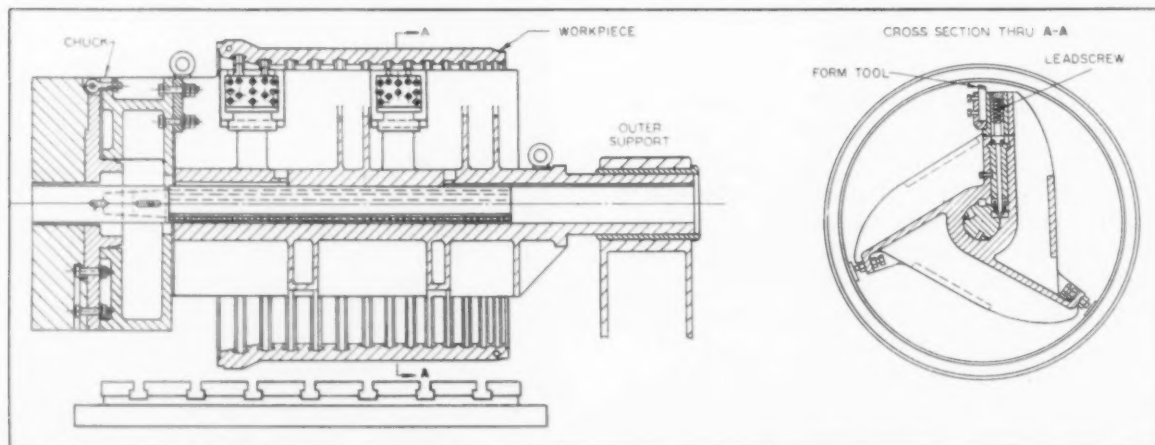
In manufacture of the jet parts, practically no automatic in-process handling equipment is employed. Plans, however, are being made to utilize the advantages of such equipment. This will be done as soon as production experience indicates how it can be employed for best results. Initial planning for automation would have precluded the possibility of achieving the original goal of production within three months.

The tooling program for these components was started from scratch. Tools, fixtures and gages had to be designed. Probably the most outstanding achievement, indicative of the tool engineering involved, is the machining of the compressor stator case, *Figs. 1 and 2.*

Compressor Stator: Inside of the stator case is machined complete on horizontal boring mills, one setup for rough and the other for finish machining. These horizontal machines are conventional boring mills from Belgium. The production achievement, however, is the result of the design of the fixtures with hydraulic pressure pads for locating and holding, and the tooling which employs a "cat's head" design of gang tooling. The multiple form tools are identified by the engineers at Bridgeport-Lycoming as the cat's whiskers, *Fig. 3.*

Because of the shape of this part and its thin section, machining operations are particularly difficult to perform within the close manufacturing tolerances specified. The holding fixtures must be designed to support the case securely in many locations to preclude the possibility of distortion during

Fig. 3. Drawing showing principal features of patented cat's head tooling. Each of the three arms of the tool holder carry form tools operating from a cam on the spindle to perform all operations simultaneously.



machining. The problem of support is further complicated by the fact that as many as 19 tools are operated simultaneously.

Before being machined on the horizontal mills, the aluminum stator, cast in two semicircular halves to facilitate insertion of the vane support assembly has the joint flanges milled, drilled and spot faced for bolts. When placed in the roughing horizontal mill, the halves are bolted to form the stator case. The machines bore the inside diameter, taper the bore, rough form all vane support grooves and faces and turn the ends and their OD.

After this roughing operation, the part is removed to another machine of the same type for finishing operations. The same cycle of operations is then performed to a finished state. This machine has 19 tools working simultaneously.

Because all finishing operations are performed in the same fixture and at the same time, concentricity is assured. Floor-to-floor time, including rough and finish machining, is approximately two hours total. This operation is performed in about the same time ordinarily required for the grooving operation alone when employing conventional methods.

In the slotting operation, the form tools enter the previously bored grooves. The table holding the fixture with the stator then advances to form one side of the T-slot and then returns to form the other. Because each slot is a different width, corresponding

to the staging of the stator blade rings, the form tools have their widths determined so the same movement of the table produces the required slot width as cuts are alternately taken from one side and then the other.

Only three operations remain to complete the machining of the stator casing. They are facing the bosses on the OD, drilling and tapping 97 holes in these bosses and milling key slots. Milled on a horizontal machine, these bosses are positioned with the aid of color-coded gage blocks. There is a gage block for each height setting of the milling cutter and a corresponding block for each table advance, *Fig. 4*.

The respective angular positions are coded similarly on the rotary table and recorded in degree settings. In this way, each boss milling is positioned simply and accurately.

Semicircular blade rings with transverse skewed slots have the blades positioned in these slots before the rings are inserted in the stator. When the stator halves are bolted together, the assembled rings and blades are locked in position; the sides of the stator grooves hold the blades from movement endwise.

Compressor Rotor: A series of wheels carrying forged blades on their rims are employed in the compressor rotor. Each wheel face is machined to a special contour depending on the compressor

Fig. 4. Milling bosses on compressor stator. Colored coded gage blocks facilitate positioning each boss.

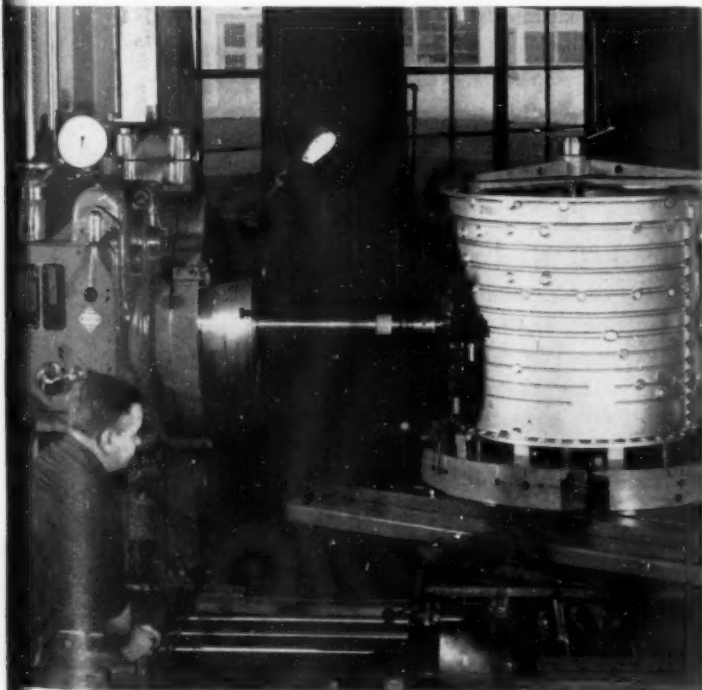
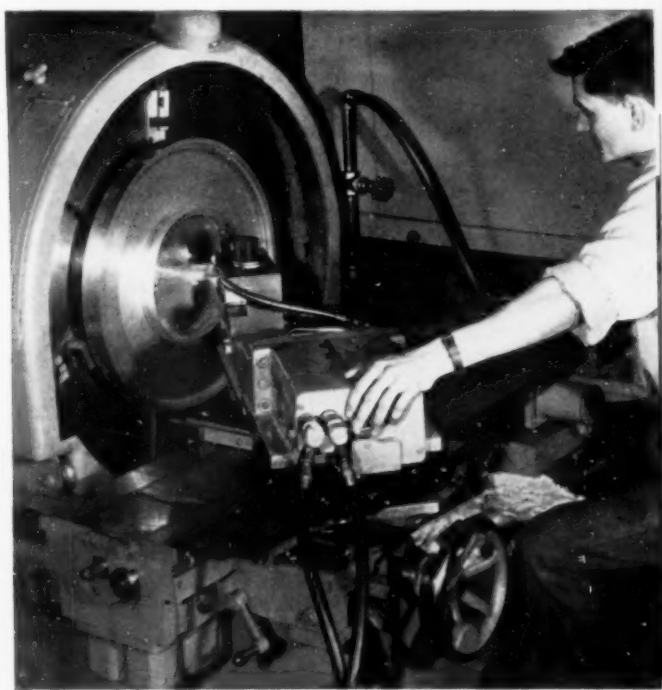


Fig. 5. Contour turning compressor wheel with hydraulic tracer on a T-lathe maintains an accuracy of one-thousandth inch.



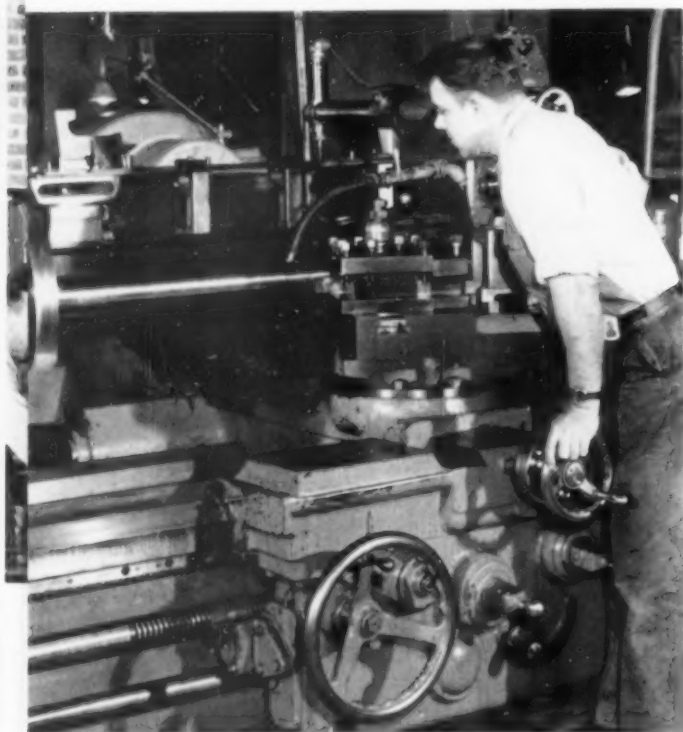


Fig. 6. Turning turbine wheel and shaft with precision electronic tracer.



Fig. 7. Assembled turbine wheel and shaft showing dovetails on buckets and finished details.

stage. Variable-speed control T-lathes with tracers automatically machine the faces and rims of the wheels. A separate lathe is employed for each stage, with a corresponding tracer template, *Fig. 5*.

Dovetails for holding the blades are broached in the wheel rims with a battery of vertical broaches. Indexing of the wheels in the broaches is automatic, there being a separate broaching machine for each stage wheel.

At present, the blades for both the compressor rotor and stator are purchased semi-finished. Prior to and after assembly they are ground to whatever size is required.

Turbine Wheel and Shaft: The shaft and wheel proper is formed by upset forging. Operations on this component are critical and must be held to close tolerances. All surfaces are machined on lathes equipped with electronic tracers that hold dimensions within 0.001 inch, *Figs. 6, 7 and 8*.

The entire shaft is bored and reamed to close concentricity tolerances. In engine assembly, a through bolt through the shaft couples the turbine with the compressor.

Because the outer rim of the turbine wheel operates at a high temperature, it is a high heat resistant alloy welded to the forged wheel. This rim and the forged wheel hub have their mating edges machined for shrink fit. After heating the parts to

the required temperatures for the fit, the rim is assembled to the shaft and welded. The assembly is then annealed, machined and inspected by X-ray for any flaws in the weld.

After passing additional tests with black light, ultrasonic and magnetic inspection, various operations of drilling, pack reaming, semifinish contouring, rough grinding, threading and milling are performed. These are followed by finish contour grinding, splining, pin-hole drilling, broaching the Christmas tree form, polishing and burring. Final operations include honing the through hole, assembling the buckets, balancing, and di-chromating.

Turbine Buckets: Precision forged buckets for the turbine shaft are individually placed in a box fixture which locates on the airfoil surface. When placed in the form grinder, this fixture assures the forming of an accurate dovetail properly located with respect to the bucket surfaces. The next operation grinds the end of the dovetail. This is followed by grinding a transverse slot in the end that receives the holding pin when the bucket is keyed to its wheel at assembly.

Sizing grinds for the leading and trailing edges of the buckets and burring are intermediate operations that are followed by an initial surface finish which is performed in an automatic machine. In

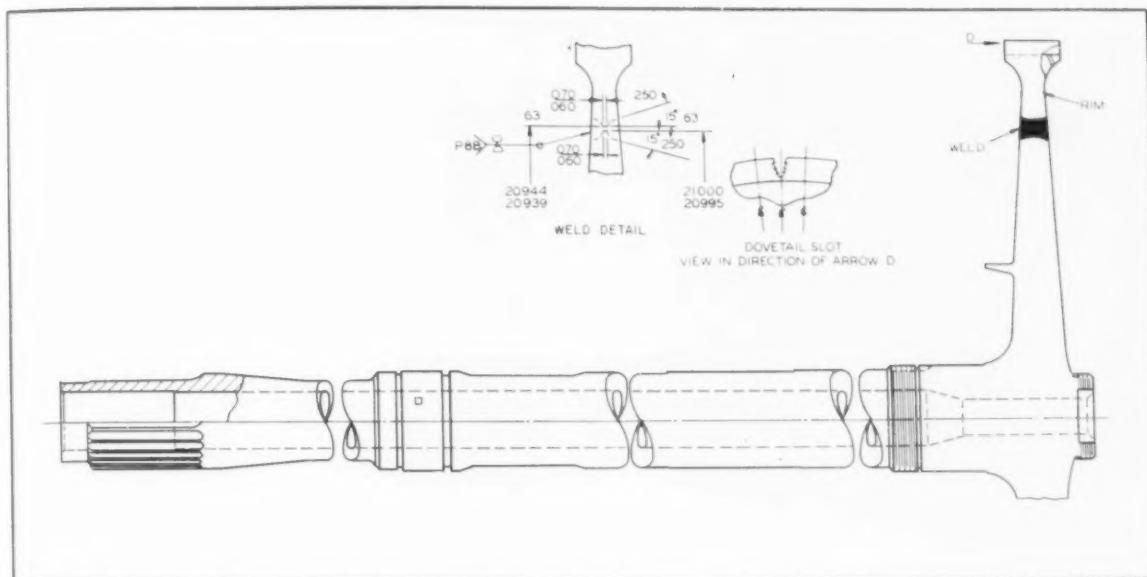


Fig. 8. Outline drawing of turbine shaft and wheel showing welded rim, dovetail detail, and through hole.

this machine, the blades are mounted on oscillating fixtures suspended in a soap solution with abrasive chips to produce a fine microinch finish. Two fixtures with multiple holding devices are sufficient to produce the daily requirements.

Following this operation, inspection with black light detects any fractures caused by manufacturing. The parts are then shot peened, final inspected and sent to stores for future assembly to the turbine wheel.

Front Frame: Immediately ahead of the compressor section of the J47 jet engine is the front frame and gear assembly which drives all accessories. The frame is cast magnesium, and its cover and rear seal are cast aluminum. All turning operations on the cover faces and sides are performed on two-spindle automatic machines, Fig. 9. Line boring of satellite holes is done on a double-ended multi-spindle automatic machine. All holes are drilled on multiple-spindle war surplus machines. Similar operations are performed on the front frame seal detail.

Major operations on the frame are performed on a battery of automatic vertical boring machines, including all the facing, turning and boring on both sides. Fig. 10. Contoured surfaces between the inner and outer shells are snagged with small portable grinders to reduce the surface contours to required profile. Gearing and miscellaneous parts for the frame assembly, Fig. 11, are also made in this plant.

Inlet Guide Vane: Differing from the other components, the inlet guide vane assembly, Fig. 12,

is fabricated sheet steel. The vanes are formed, seam welded, annealed, coined and trimmed. They are filled with matrix alloy for final forming and trimming at each end to length.

Both bands to which the vanes are attached are pierced with tear drop contours to accept the finished shape of the vanes and are then arc welded into rings. The vanes are tack welded to the bands for holding purposes and then finish welded at both ends securing the vanes to the inner and outer bands.

Two roll formed and machined steel rings are welded to the inner band. At this stage the sub-assembly is sand blasted to prepare the surfaces for

Fig. 9. Double-spindle automatics perform all turning operations on cover for front frame.



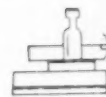


Fig. 10. Vertical boring machines face, turn and bore the cast magnesium front frame.

plating. After plating, other sheet steel details that have been sheared and either rolled formed or die formed are attached by spot welding and seam welding, followed by stress relieving. Then both sides of the heat-treated assembly are machine rolled or turned on a stub lathe, seal rings are assembled, and drilling and burring operations are performed.

Heat Treating and Plating: In this department all magnesium parts are di-chromated and all aluminum parts are anodized to provide resistant surfaces. All gears are carburized, heat treated, and given a rust resistant surface treatment. Also,

chrome plating, copper plating, and nickel absorption plating operations are performed in this department. Masks for the gears and other parts being treated are molded rubber and are molded in the shop as needed.

Production Engineering Laboratory: Complete testing facilities for both physical and chemical analyses are maintained in the laboratory. Incoming materials are checked for conformance to specifications and a close control is maintained on shop processes such as heat treating, plating and chemical conversion coatings.

Fig. 11. Partially assembled front frame on an assembly fixture.

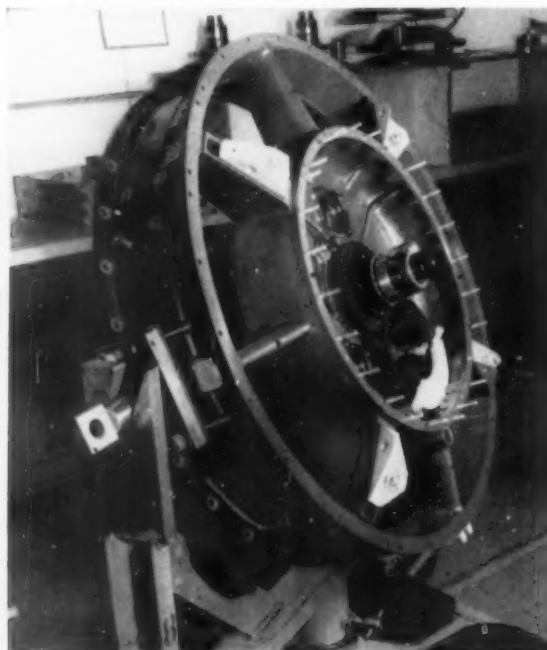


Fig. 12. Inlet guide vane fabricated from formed and welded sheet steel.

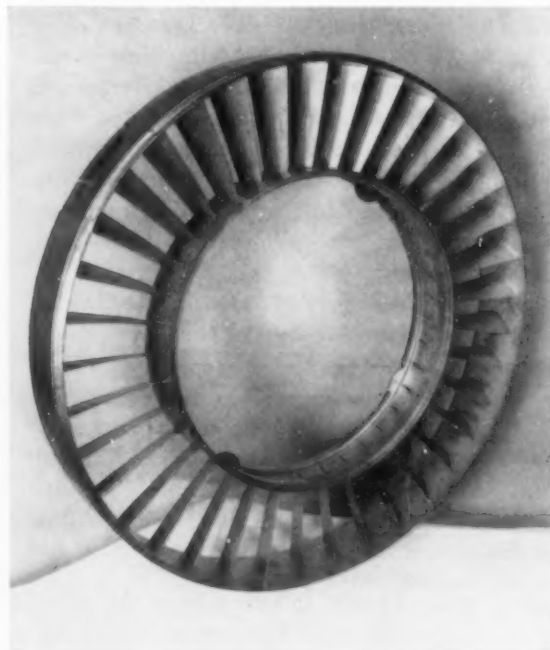


Fig. 13. Quality control checking of turbine wheel. Blade spacing and position are being checked.



Quality and Tool Control: The quality control room is air and humidity controlled to insure that measurements of the parts being checked are consistent. All gages are placed in the room 24 hours before being checked to assure stable conditions of temperature.

When the masters and the gages are under the same temperature conditions for a period of 24 hours, they are both stabilized and any possible variance of expansion or contraction due to temperature differentials is eliminated.

This room has two basic functions: Controlling quality of produced parts by means of intermittent inspection of each operation in process and controlling quality of accuracy of gages in use by checking them against masters. Although most of the parts inspection is performed in process in the shop, the quality control room serves as a periodical check on over-all dimensions and finished parts quality, *Figs. 13 and 14.*

Every gage in the plant is inspected by the time-cycle system. Cycle time is stamped on each gage and it must be inspected and checked at that time. Some gages are cycled weekly, others daily and a few are cycled for checking each time they are used. In this way, continuous accuracy of the gages is insured, the frequency of checking being determined by the type of gage and the severity of its usage.

As in the quality control room, the tool control room is air-conditioned and equipped with surface plates and precision instruments and gages. All tools are also time cycled for checking like the gages. Many form tools and preset tools are employed, requiring periodic checking to maintain the tolerances required in production. The frequency or period of inspection of each tool is based

upon shop experience. All fixtures are checked similarly in the tool control room by the same method.

These systems of control guarantee to the production department, management, and the prime contractor that production is proved for 100 percent operation on a quality recheck basis. Production experience with the operation of these control methods and the in-process inspection utilized has proved the effectiveness of these methods. The high production and low rejection rates experienced in the manufacture of these critical components have justified the special inspection and control methods employed at the Bridgeport-Lycoming plant.

Fig. 14. Quality checking front frame cover and front frame.



Developing Special Machines

To Increase Production and Reduce Costs

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ONLY UNDER PROGRESSIVE and patient management is it possible to acquire and use special machinery. Without optimism the initial gamble will not be made because an identical machine cannot be seen in operation in some other plant. A progressive manager will realize that any special machine will have more faults than a standard machine because it is the first of its kind. However, if he has confidence in his organization, he will know that these faults will be corrected.

Availability of skilled tool and maintenance help is also essential. As with any machinery, proper care of tools, normal repair, adjustments, and lubrication are important. Considering advances made in the past few years in the field of hydraulics and electronics, this type of skilled help is now a must in the successful use of special machinery.

A third factor is the attitude of production supervisors. Every effort must be made to convince them from the start that their interests are being considered and that they are a part of the team. They should be brought into design meetings and their suggestions and opinions given careful consideration. A selling job is necessary to be certain they understand that the success or failure of special equipment to a large degree is a reflection of their supervisory ability. If their cooperation can be secured, the possibility of successful operation is vastly increased.

While there are probably many versions of what constitutes a special machine, a definition for the purpose of this article is: "any piece of equip-

ment which, because nothing is available on the open market, must be specially constructed to perform one or more operations on a product." This may mean a complete new design, *Fig. 1*, or it may mean converting standard punch presses, milling machines, etc., so that in effect they become special machines, *Fig. 2*.

Where do the ideas for special machinery originate? Employee suggestions, or production supervision may submit ideas which result in new and special equipment. Top management or members of the production engineering group may make suggestions which eventually lead to special machinery. For example, a few years ago some of

Fig. 1. Coil winding machine developed to replace the old method of hand wiring. A battery of three machines can be handled by one operator. In addition to effecting appreciable labor savings, the machine brought about an improved product due to greater uniformity of winding.



Based on a paper presented before the Tenth Annual Machine Design Conference at the Cleveland Engineering Society.

our production engineers visited a plant which made shotgun shells. The methods used by that plant looked favorable for small parts assembly. As a result today automotive type condensers are assembled in our plant using some of the features employed in the shotgun shell plant, *Fig. 3*. While these two products are certainly dissimilar, enough ideas were obtained to start a project rolling. The group of machines now installed have proved their economic value.

While ideas may flow freely, the job of screening out those which are impractical from an economic standpoint is of utmost importance and requires an extremely accurate analysis. In the first enthusiasm for a new idea many factors which could have a detrimental effect are apt to be ignored. The labor savings can be roughly estimated at this time by assuming a production figure for the new method. In most cases the cost of the equipment can also be roughly estimated. If these figures appear favorable, then a detailed analysis should be made. Also, if the job is sizeable, it will be wise to call a meeting of representatives from production supervision, product engineering, plant engineering, tool and machine building supervision, machine design and cost accounting, for the purpose of discussing factors that apply to each group.

Production Rate: This figure might be assumed to be so apparent as to require no check. However, a careful study of the actual production possibility of the present method may show that the rate is or could be considerably different from what is generally recorded or accepted. Relatively inexpensive changes may make it possible to produce at a higher rate. The proposed method should be compared to the best possible performance of the present method.

The production rate of a proposed machine, *Fig. 4*, may be fixed by the rate of a balanced line in which case there would be no value in producing more pieces than are fed to it by preceding machines, or can be used by machines following it. If the machine is not in a balanced lineup, the production rate may be determined by the cost of the equipment. If multiple machines are required it may be possible to operate more than one per operator, and this might be profitable even though the productive rate per machine is lowered. Very expensive machines may be operated more hours per day to keep down the number of units required. Due to seasonal demands or other causes, the immediate production schedule may be high or low. One of the fundamental facts to know is the maximum production that will be really. An average figure would be about 20 percent, required and the daily hours or work shifts that will be available to produce this schedule.

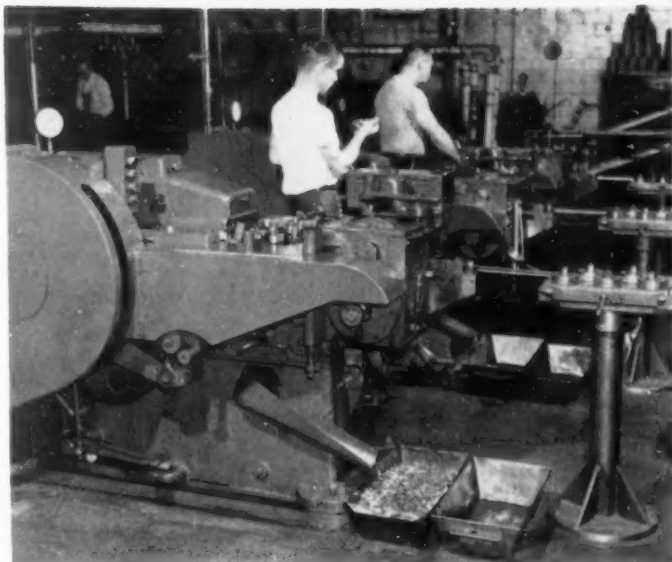
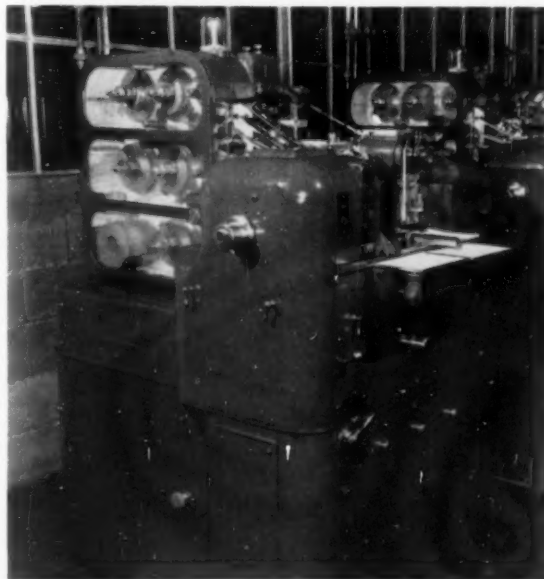


Fig. 2. Standard headers tooled to make two commutator bars at a time.

Cost of the special machine: This should include the cost of designing, building and "bugging." The most difficult part of the estimate is the latter which may run from 10 percent to 100 percent above the cost of building the machine originally. An average figure would be about 20 percent.

How long will the model remain in production? Checks with sales and engineering departments will show whether there will be sufficient total production to be certain that the cost of the equipment will be amortized before it is obsolete. The salvage value of replaced equipment may be credited to the savings of the new method.

Fig. 3. Automatic condenser winding machine wraps alternate layers of aluminum foil and paper, cuts off and applies glue to hold the condenser together.



Model Changes: When a considerable expenditure is contemplated for new equipment, it is wise for sales and engineering to study the model for desirable changes that might improve the quality of the product and at the same time add to the prospective savings. The proposal to change a method of manufacturing may stimulate the imagination of the product designer, causing him to think of possible changes which had not previously been under consideration. Often minor concessions by engineering will simplify the special machine.

It may be possible to design the machine without seriously restricting the possibility of producing similar pieces of different size or design, *Fig. 4*. This should be given thorough study; otherwise even minor product design changes might obsolete expensive production facilities. Where there is complete assurance that no changes are contemplated, the cost of the machine may be kept down by limiting its application.

Effect on Other Operations: Often the use of a special machine to perform an operation will be affected by the condition of the parts fed to it to such an extent that improvement or changes may be required in the preceding operations. This may affect the saving adversely or lead to further cost reduction. Generally, the necessary improvement in the parts to be processed in automatic machines would have been as desirable and profitable for hand operation. For instance, in the manufacture of automotive generators, the use of special automatic lead connecting machines forced an improvement in the commutator notching operation. Although this was not initially contemplated, the new machines which were then developed for this purpose gave the required improvement and paid for themselves in eighteen months.

The cost of installation, conveyors, ventilation and improved facilities, such as transformer capacity, also power, air, gas and water lines, and

all other costs that may be incurred in the use of special machinery should be included for the purpose of calculating return on investment.

Material Cost: The new method may change the amount of material required per piece or may change its specification. If the use of a more costly material is required for the successful performance of the proposed equipment, the additional cost may nullify other savings. The scrap or re-operation cost should be considered in the justification of special equipment. In one instance, a special machine was built to make a part previously purchased outside, but when the cost of scrap parts was charged against the saving, the special machine failed to make the estimated return on the investment.

Effect on Plant Overhead: A part of the saving may be nullified by ignoring the increased cost of perishable tools and nonproductive materials required by the new method. On the other hand, the new method may decrease the cost of such materials. On one occasion, a special broaching machine was built for removing welding flash from a part. There was no labor saving but the lowered cost due to eliminating the purchases of grinding wheels justified the investment.

Power, steam, gas and air, may be an important factor in the cost of operation and should be checked when an estimate is being prepared. An air blast to eject heavy pieces may cost as much as labor to unload by hand.

Cost of machine and tool maintenance should be included in the estimated cost. Usually, machine maintenance cost will increase if the equipment increases in complexity. It may temporarily decrease due to the difference in ages of the old and new machines but the average, over the life of the equipment, should be considered.

The changed capital investment will alter annual charges for depreciation, insurance, taxes, and other items.

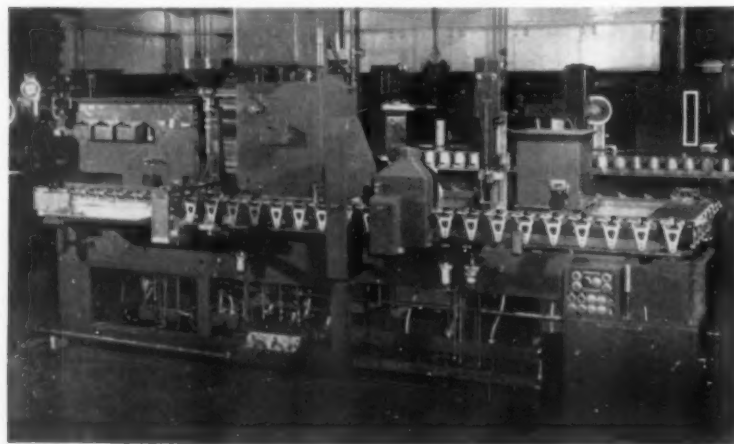


Fig. 4. In-line type indexing machine for assembling distributor levers. It can be fitted with welding, riveting, machine attachments and automatic feeding devices for handling small parts. Inspection stations can be installed to make sure all parts are in place.

Developing the Machine: If the initial considerations indicate that the proposed equipment is a worthwhile investment, the stage is set for design layouts. The most economical place to correct mistakes in special machine building is on the drawing board. The ideal time for the first design conference is after the first rough layouts are made. Naturally the designer has talked with a number of people in getting ideas to make these layouts but the design conference is called for the purpose of trying to discover flaws in the design. This conference must be handled by a skilled leader to be sure that all basic faults of the design are discovered. This procedure may sound a little harsh on special machine designers, particularly the sensitive type, but a good conference leader can sell the designer on the long-term advantages of modifying or possibly starting anew at this stage rather than having to dispose of a physical machine or parts at a later date.

The design conference also provides an excellent opportunity for production supervision to become well acquainted with the proposed equipment. Having had a part in the actual design, supervision will realize that the equipment is being built for them and is not being forced on them. Selling down the line is as important as selling to management.

The major factors to be considered by the designer and the design conference are as follows:

1. Analyze the motions and their sequence: To do the work on the product that has been planned, the designer will find that certain movements or machine components are necessary and that they must occur in certain time relation to each other. This will establish the minimum possible cycle time.
2. Decide the type of machine which can best accommodate the movements and sequence. This may be a single station dial, in-line, drum type, etc., and may be horizontal or vertical, Fig. 5.
3. Analyze the forces required to be transmitted by the movements, as well as feeds and speeds.
4. Study the most suitable means for supplying these forces. This is a controversial matter since it involves a choice between mechanical, hydraulic, air and electrical forces. If the designer and the supporting engineering group has had sufficient experience with all four, the choice can be made intelligently. On occasion one of the four methods will be definitely indicated; on others personal preference can rule.

The layout of the machine should be thoroughly dissected in the design conference which includes everyone who will have a responsible connection with the use of the equipment. In addition to the four preceding factors, the following items should be considered:

WEAR: Parts subject to wear should be designed for ease in adjustments and replacement and also

should be inexpensive. Parts that would be costly to replace as a whole, may require wear inserts.

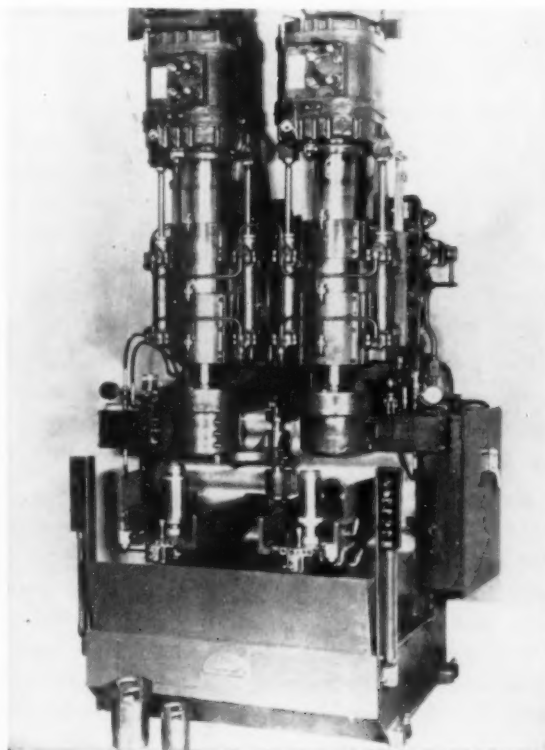
LUBRICATION: Too often this is ignored until a special machine is completely assembled. Then it is found difficult to carry oil to the points where lubrication is necessary. As a result, hardened parts may require annealing to provide oil passages. Lubrication should be effective but without excess leakage, which could make the machine unsightly or damage the work being processed.

CONTROLS: They should be convenient and easy to operate. High-speed machines should have inching buttons.

SAFETY: Both the operator and the machine are to be considered. Adequate guards and feeding devices should be provided to protect the operator. Built-in devices to protect the machine against overloading and improper sequencing will prevent many costly breakdowns. Some of these devices may be planned at this stage, but others will be added when the machine is being bugged. If the designer is overly cautious, however, he may specify so many safety devices that they become a source of trouble.

OPERATOR COMFORT: The operator's position at the machine and the controls he must operate will affect his satisfaction with the machine. His duties should be minimized but he should have

Fig. 5. Vertical molding machine having two lower half molds and oscillating table. This design utilizes cure time to remove parts, clean the mold, load inserts and molding material for the next cycle.



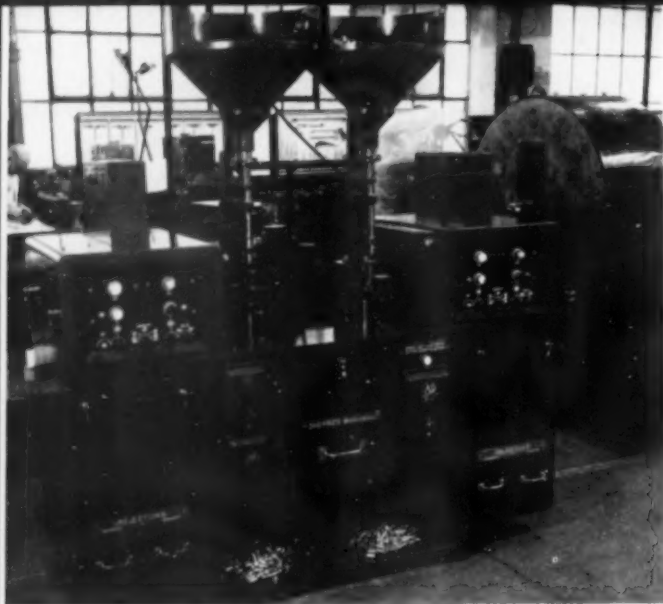


Fig. 6. Designed to automatically test capacitor windings this machine replaced the old method of hand testing. It segregates defective windings including shorts and out-of-limit windings.

sufficient regular work to perform.

APPEARANCE: It costs little more initially to make the machine attractive, *Fig. 6*, but this expense will be regained through lower maintenance. Heavy guards with smooth contours can dress up a machine as well as protect working parts. Flimsy guards, however, soon become out of shape, fit poorly, and detract from the appearance of the equipment. Decorative chrome on controls and important parts will deter the operator from damaging them. Forty-eight special machines built at Delco-Remy twelve years ago had considerable attention paid to their appearance. They have required less than average maintenance and still look good.

TRICK MECHANISMS: A design to be good need not be novel. It is better if nothing really new is incorporated in the machine. If all of the mechanisms have been in successful use, they will have been bugged. Tool and maintenance personnel will be familiar with them. Simple, proved mechanisms can be combined to produce practically any movement in a special machine.

SETUP: The machine will occasionally have to be moved from one place to another. The designer should provide eye bolts and prying lugs so that the machine will not be damaged in handling.

BUILDING THE MACHINE: During all design stages, the project engineer, who has made the cost estimates rechecks his figures and, when the estimates are as complete and as accurate as possible, makes a project report. This covers present and proposed methods, estimated cost of new equipment, estimated savings, and investment return. Requests are then made for appropriation approval, to start construction of the machine.

After the project has been approved and the machine is under construction, the machine building shop and designer must work closely together to be sure that the drawings are like the machines. The shop is permitted to make changes necessary to produce a successful machine, and the drawings are altered accordingly.

MAKING THE MACHINE WORK: This requires the highest order of ingenuity and patience. Fully 20 percent of the cost of the machine will be expended during this period. Special machines are not built by pessimists and the optimism of the builders is seldom justified on the first try-out. Two dangers exist at this stage—the first is the tendency to make radical changes in the machine; the second is an unwillingness to make necessary changes. Experience and sound judgment are the only guides. To one who is not in close daily contact with the machine, it would seem that the machine builder does not know what he is doing. Today he knows just what is wrong. Tomorrow it is something different. He is always apparently on the verge of getting the machine into operation. Bugging a complicated special machine may extend over a considerable period, but it is truly remarkable how seldom a skilled development organization will have complete failure.

When the machine begins to perform with reasonable success it is time to place operators on it and attempt production runs. Control of the machine should be taken from the builder and placed in the hands of the operator-trainer. The viewpoints of these two individuals are entirely different. The mechanic is in the business of building machines and it is hard for him to finish a machine he has worked on for, perhaps, months. On the other hand, the operator-trainer is interested in the machine only as a means of producing so many parts per hour. He wants to run it as long as it will produce and resents any shutdown.

The trainer's job is to understand people and their movements as well as the machine builder understands the machine and its movements. Production supervision and time study personnel work closely with the trainer, so that the job may be moved into production and produce at an agreed rate when it is ready.

A good operator-trainer gets a new machine into the production line in the shortest possible time. In a special machine building organization he is invaluable.

Within a reasonable time after the machine is in production, its performance record is checked to see if the original estimates have been met. This check should be as complete in detail as the original cost estimate to which it is compared. Any variations from expected performance should be studied and recorded for use on future designs.

Ball Bearing Lubrication

FACTORS TO CONSIDER in the choice of oil or grease as the lubricant are speed and temperature of operation. Load is ordinarily not a determinant since either grease or oil is recommended for any load condition. In general, oil can be used for most high temperature applications and any speed condition. For extremely high-speed applications, such as grinding spindles rotating at 50,000 rpm, high grade spindle oils having a viscosity of 100 to 150 seconds Saybolt at 100 F are generally recommended. The viscosity apparently decreases to the right point as the temperature rises during operation. In drip-feed systems, five drops per minute seems to be adequate for speeds within the range of most precision spindles.

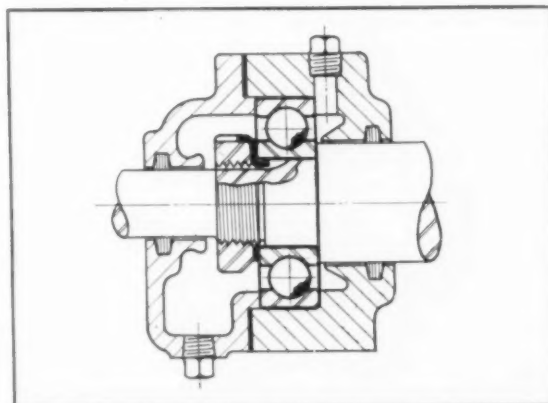
Grease can be used under low or moderate speeds not much higher than 5000 rpm. Ordinary cup greases are used at temperatures between -15 and 150 F. Higher grade ball bearing greases are recommended at temperatures up to 200 F. Grease is the easiest lubricant to use with vertical mounts and should be employed wherever possible.

Prelubricated, sealed and shielded bearings are used in cases where free grease might injure other parts, as in electric motors; where space limitations rule out grease or oil fill housings; where housings cannot be kept free of grit, water or other contaminants; and where relubrication is impossible or where it would be a hazard to satisfactory use.

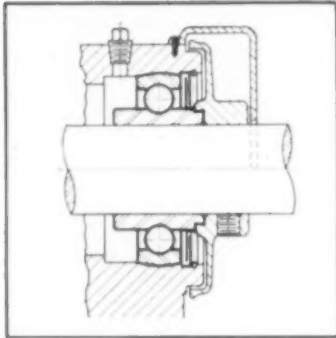
The information and accompanying illustrations presented are by courtesy of Fafnir Bearing Co.

Grease Lubrication

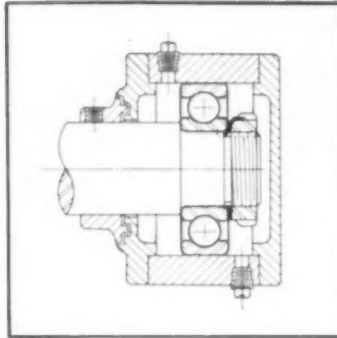
A good general purpose grease should be: neutral (free from acids or alkalis), chemically stable, free from fillers or impurities, unvarying consistency (about No. 2), of good film-strength and adhesive qualities, water-resistant, low in internal friction, nonoxidizing. In addition there should be no separation of the oil from the soap base, no great aeration and no excessive hardening at -10 F. Overlubrication should be avoided. Too much grease causes churning with a consequent rise in temperature. The grease-lubricated bearing housings shown illustrate typical features for lubricant retention and exclusion of dirt, water, and other contaminants.



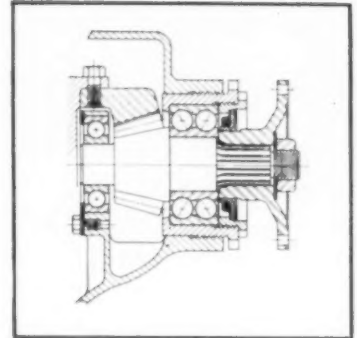
Felt seal with reservoir and drain. Permits higher speeds with wider choice of lubricant as only limited amount of grease stays in bearing.



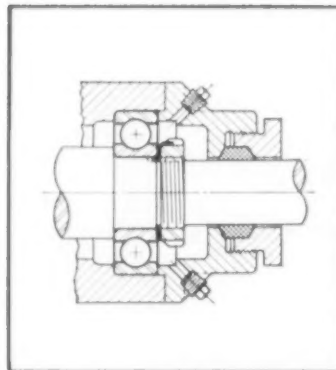
This slinger-labyrinth type seal is provided with a shroud for extreme operating conditions.



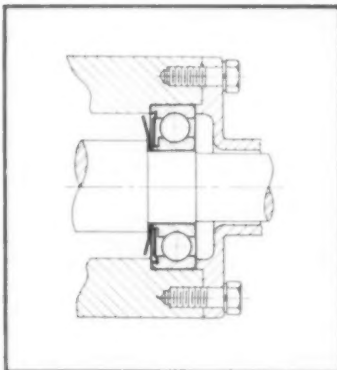
External labyrinth provides adequate seal for many applications and at the same time serves as vent.



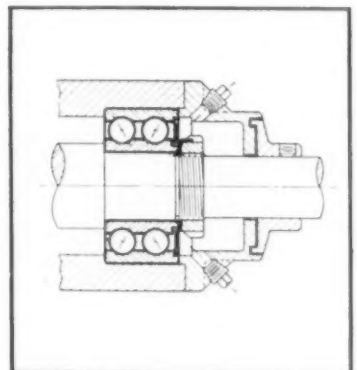
Leather seals must be carefully mounted according to recommendations of the manufacturer. Also usable with oil.



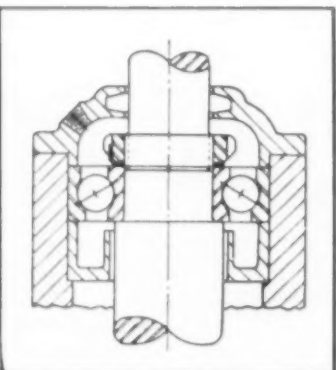
A stuffing box seal is used to prevent the escape of lubricant when housing is subjected to pressure differential.



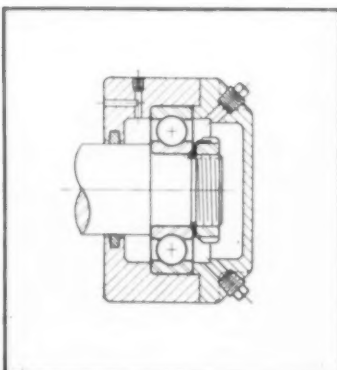
The dished slinger acts as a baffle supplementing the dirt excluding action of the grease shield.



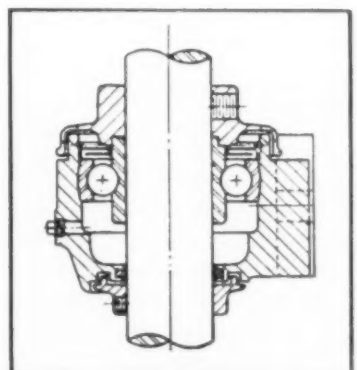
Grease shield type bearing has a large grease chamber packed with water-repellent grease. The slinger provides additional protection.



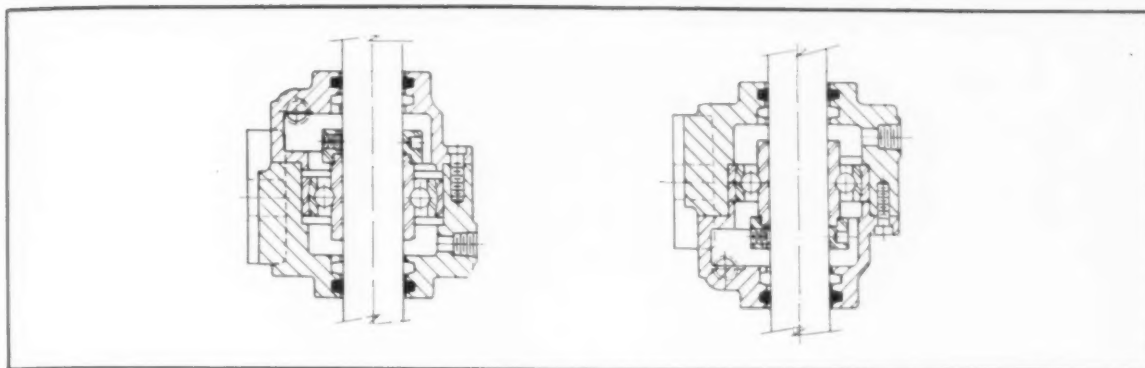
A trap below the upper bearing when two are used in a vertical mounting serves to retain the grease and to prevent excessive accumulation in the lower bearing.



Vent drilled into housing allows for escape of expanding air.



Extra slinger provided in vertical mounting seals against extremely dirty conditions or liquid following the shaft down to the bearing.

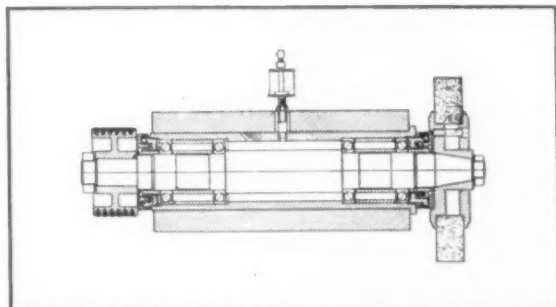


A fairly high temperature vertical application using fixed and floating units permits frequent replenishment of the grease which is necessary due to its tendency to harden and

carbonize at high temperatures. Periodic flushing of the housings with hot oil is made relatively simple. Two views are shown to clarify details.

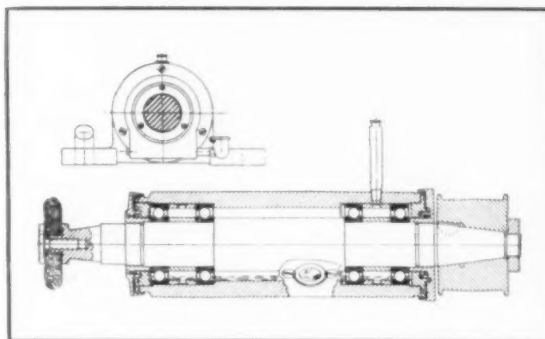
Oil Lubrication

Mineral oils of the best quality should be used, such as automobile and engine oils of the better grades. SAE 30 oil is generally satisfactory. Synthetic oils are used successfully in instrument bearings and for high and low temperature applications. Animal or vegetable oils should never be used since they become gummy and decompose to form corrosive substances.

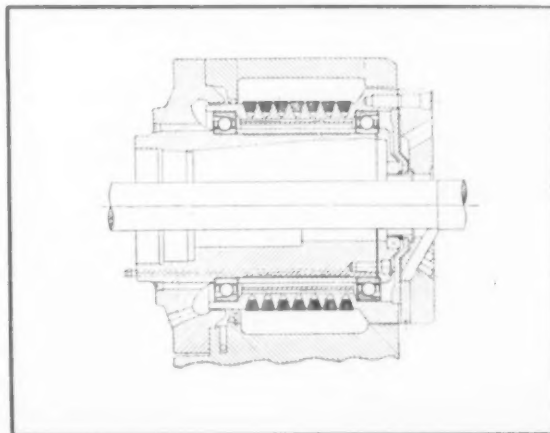


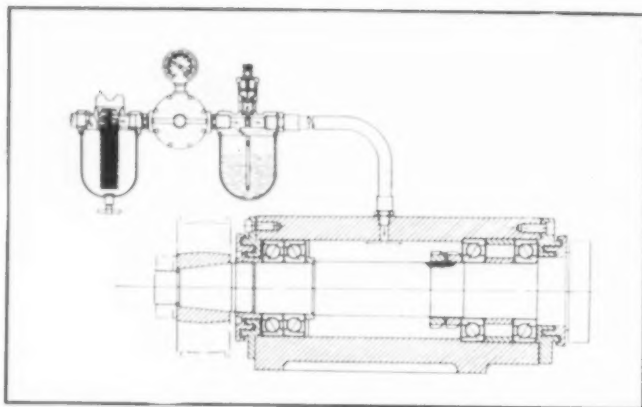
Drip feed is used for high speeds and moderate loads. Constant supply of lubricant assured. Feed in drops per minute is determined by closely observing operating temperature.

Force feed circulation is used for applications where operating conditions are severe, such as in large machinery or at high operating temperatures. An adequate draining system prevents excess accumulation of oil. Where loads, speeds, and temperatures are all high, the oil is cooled.

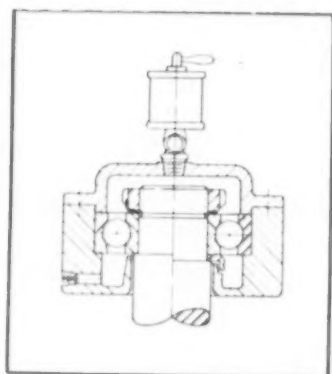


With bath type feed, the level of the oil should be just below the center of the lowest ball. The reservoir is of small depth and large area. Add oil with shaft stationary since running level is lower than stationary level. Oil level cups are mounted to prevent shaft rotation from forcing out oil (end view).



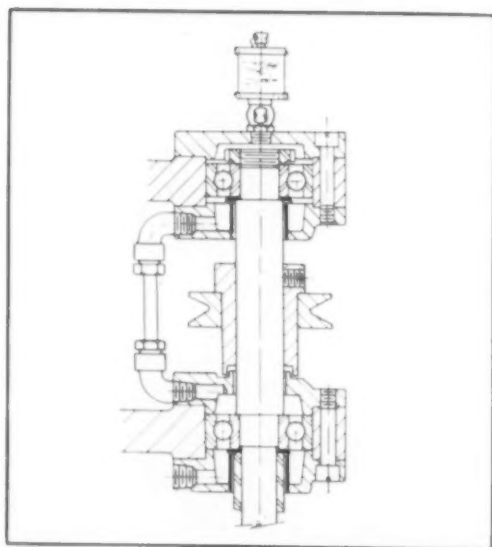
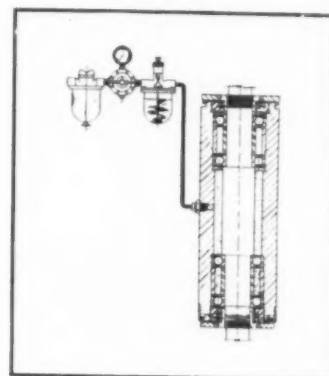


Oil mist method applies to extremely high speeds. Bearings are lubricated, cooled, and kept clean by a rapidly circulating oil mist. The oil is vaporized and forced through the housing by dried and filtered compressed air, escaping through the labyrinth seals.



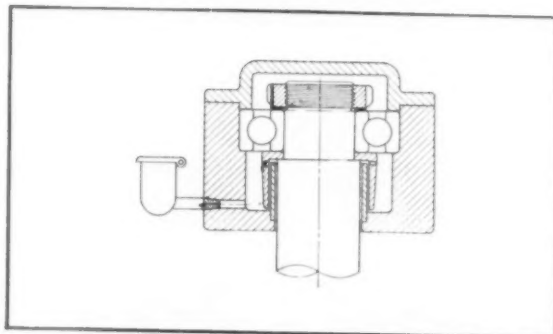
Rotating internal slinger (right side) prevents escape of oil down the vertical shaft. Preferable to housing on left side.

Vertical shaft mounting is lubricated by oil mist method.

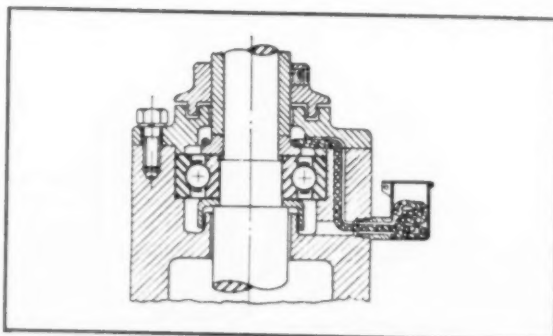


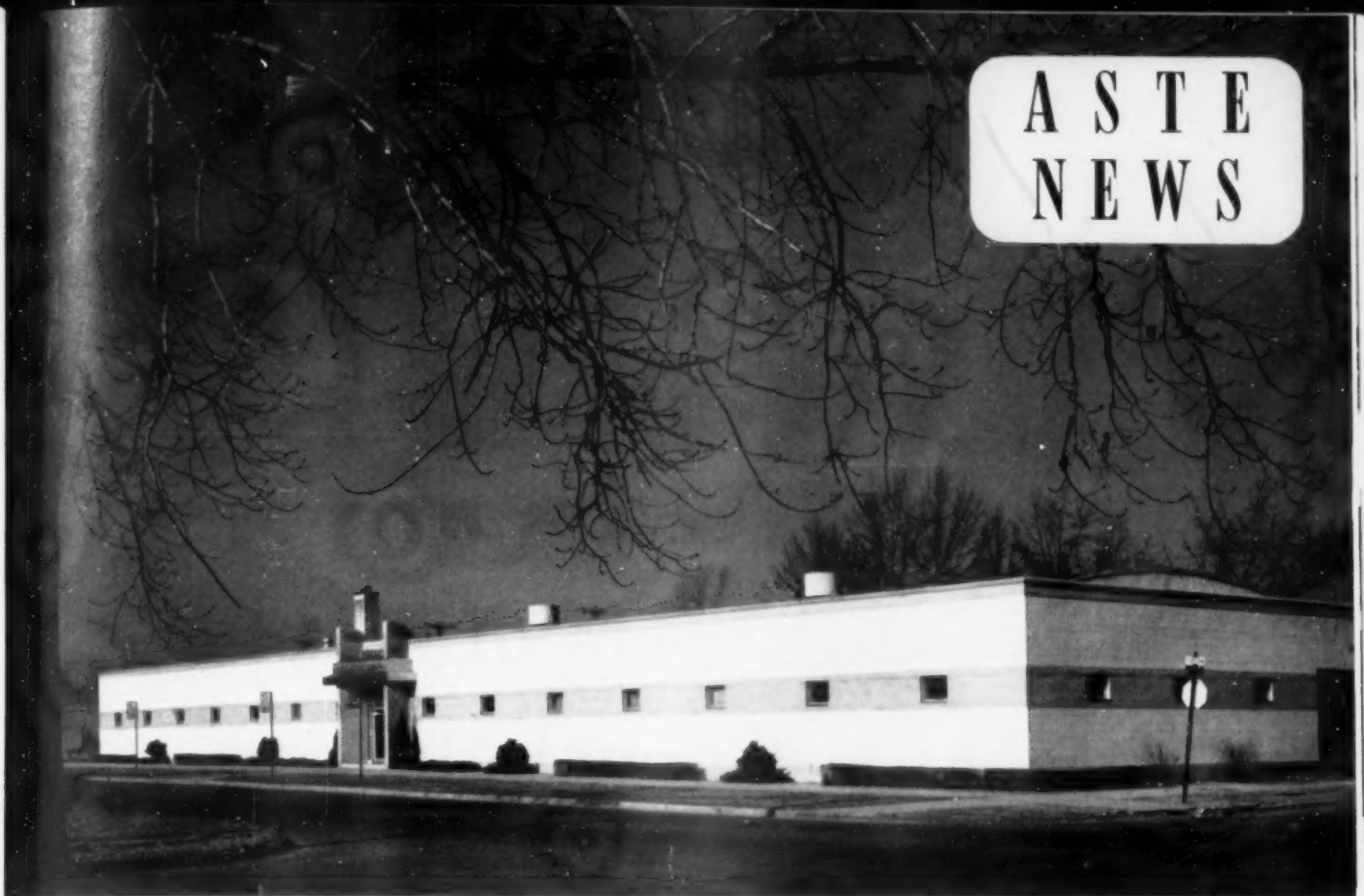
This arrangement allows oil to pass from the upper bearing to lower. An outlet below the lower bearing permits drainage or return of surplus to a pump for recirculation.

The wick feed used primarily in vertical mountings, requires a rather complicated housing. Careful selection and adjustment of the felt wicks is required. It is difficult to determine whether adequate amounts of oil are reaching the bearings.



The internal slinger with tapered OD seals the oil in the housing and also lifts the oil, splattering it into the bearing. The hole near the top of the slinger acts to vent the pressure on the inside of the housing to prevent siphoning oil down the shaft. Oil level is maintained slightly below this hole by the filler cup.





featured this month . . .

ASTE Annual Report	83	Des Moines	101	New Haven	101
Award for ASTE Public Relations	100	Detroit	100	Niagara District	97
Chapter Chairmen	110	Elmira	95	Northern New Jersey	100
Coming Meetings	109	Erie	108	Peoria	97, 105
Connecticut Day	105	Fairfield County	102	Peterborough	109
Obituary	103	Fond du Lac	108	Philadelphia	102
Positions Available	104	Fort Wayne	99	Piedmont	106
Position Wanted	104	Fox River Valley	108	Potomac	102
West Coast News	94	Golden Gate	96, 102	Racine	94
		Grand River Valley	97	Rochester	102
		Granite State	106	Saginaw Valley	106
		Greater New York	101, 108	St. Louis	107
Albuquerque	109	Hamilton District	95, 96	Salt Lake City	102
Atlanta	94	Hartford	99	San Diego	98
Baltimore	103	Indianapolis	98	Santa Clara Valley	101
Binghamton	107	Kansas City	105	Springfield, Ill.	109
Boston	106	Lehigh Valley	108	Toronto	99
Buffalo-Niagara Frontier	103	Long Island	103	Twin States	95, 96
Cincinnati	107	Los Angeles	95, 97	Wichita	98
Columbus	105	Madison	104	Williamsport	104
Dayton	96	Montreal	100	Windsor	97, 103
		Nashville	108	Worcester	95, 104



L. B. Bellamy, far right, administers the oath of office (from left) to: Wayne Ewing, R. C. W. Peterson, H. E. Collins, Howard C. McMillen, H. B. Osborn, Jr., Joseph P. Crosby, and Roger F. Waindle.

National Officers of ASTE Elected at Annual Meeting

By Nancy L. Morgan

A full and varied program of technical sessions, panel discussions, plant tours, meetings and banquet activities greeted the more than 1,500 ASTE members who attended the 21st annual meeting held March 18-20 in Detroit.

New national officers were named by the Board of Directors and installed at the membership banquet. Members of the board, elected by the House of Delegates, will take office at the semiannual meeting to be held in Dayton, Ohio.

Roger F. Waindle is the 1953-54 president of the Society, succeeding L. B. Bellamy. Other officers are: Joseph P. Crosby, first vice president; Dr. Harry B. Osborn, Jr., second vice president; Howard C. McMillen, third vice president; Raymond C. W. Peterson, secretary;

Harold E. Collins, treasurer; Wayne Ewing, assistant secretary-treasurer; Harry E. Conrad, executive secretary; and Allan Ray Putnam, assistant executive secretary.

Serving on the 1953-54 Board of Directors will be: Willis G. Ehrhardt, George A. Goodwin, Ben J. Hazewinkel, Gerald A. Rogers and Richard A. Smith. Also elected were Messrs. Waindle, Crosby, Osborn, McMillen, Peterson and Collins. Mr. Bellamy is automatically a member as immediate past president.

Among the actions taken by the board were the appropriation of \$3,300 for a study devoted to "researching the tool engineer," and the raising of the membership requirement for new ASTE chapters to 75 charter members. The board also decided on Dayton, O., as the site for its semiannual meeting on October 30-31. Dayton's ASTE chapter will be host to the national officers and directors. Present plans call for the meetings to be conducted at the Dayton Biltmore Hotel.

Committee Chairmen Appointed

Appointments of chairmen to head the national committees were announced by President Waindle. Heading committees again this year are: Francis J. Sehn, reappointed chairman of the Book Committee; Arthur R. Diamond, reappointed chairman of the Education Committee; William H. Smila, reappointed head of the Honor



A serious discussion gets the concentration of Gen. Thomas K. Vincent, banquet speaker, R. F. Waindle, ASTE president, and L. B. Bellamy, past president.

Awards and Judicial Committees; A. B. Clark, renamed chairman of the Membership Committee; and Edward H. Ruder, 1952-53 chairman of the Constitution and Bylaws Committee and now head of the Public Relations Committee.

R. B. Douglas, a past president of ASTE, is serving as chairman *pro tem* of the Research Fund Committee again this year and R. C. W. Peterson is acting chairman of the Standards Committee.

Joseph L. Petz was named chairman of the Editorial Committee, John X. Ryneska was chosen chairman of the Constitution and Bylaws Committee, and H. Dale Long was named head of the Finance Committee. In charge of the Professional Engineering Committee is Prof. L. E. Doyle and the chairman of the Program Committee is Kenneth W. Riddle.

The major address at the membership banquet was delivered by Brig. Gen. Thomas K. Vincent, commander of Redstone Arsenal, Huntsville, Ala., and head of the Army's guided missile and rocket research and development program.

Production of Guided Missiles

Speaking to a capacity audience in the grand ballroom of the Sheraton-Cadillac Hotel, Gen. Vincent said thousands of small tooling and metalworking firms throughout the country are involved in production of guided missile parts. "These concerns," he declared, "are the backbone of the missile program, cooperating with more than a score of large prime contractors."

Gen. Vincent disclosed that at least two missiles, including the *Nike*, are now in production and soon to be released to operational branches of the armed forces. The Army has been experimenting for more than a year in the use of the new ground-to-air weapons, both at Huntsville and White Sands, N.M., it was learned.

These missiles, he pointed out, have been developed to the stage of pinpointing the target in terms of yards rather than miles, as with the German V-2. Reliability of missiles is dependent upon the accuracy of several hundred small parts which are the responsibility of production and tool engineers. The program has been a practical, step-by-step approach, far from exaggerated stories of

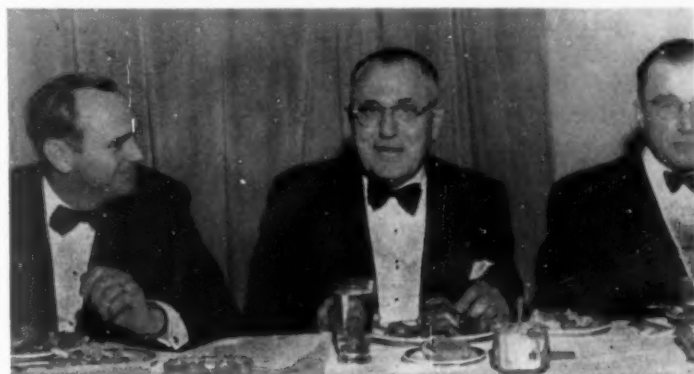
Pictured below is one of the many tables set up for the membership banquet which was a sell-out.



Toastmaster John C. McCurry shares a bit of humor with Harry E. Conrad and Joseph P. Crosby.



Banquet smiles come from Past Presidents Ray H. Morris, Frank Curtis and Walter Wagner.



National Directors Ben J. Hazewinkel and Willis G. Ehrhardt and Past President J. J. Demuth.

At the head table were Past President Frank Shuler and Otto Winter and Host Chairman Andrew Carnegie.





The Detroit Boat Club was the setting for one of the luncheon programs enjoyed by the ASTE wives.



Among those attending were Mrs. Joseph J. Crosby, Mrs. Leslie B. Bellamy and Mrs. Roger F. Waindle.

space stations and lunar rockets, he said, though we have progressed beyond known physical laws and are reaching into the unknown.

More than fifteen kinds of engineers from architectural to electronic, are needed in the program, in which the scientist, designer, metallurgist, tool engineer and manufacturer must cooperate, Gen. Vincent said. The guided missile is the most complex device ever launched into the air and the tool engineer's special role lies in a production of intricate parts economically. "Without the tool engineers," he declared, "there would be no guided missiles—in fact, no defense program."

Toastmaster for the banquet was John C. McCurry, general manager of the Michigan Manufacturers' Association. Entertainment was provided by a choral group from the Ford Motor Co. called "The Continentals."

The banquet also climaxed a busy program of activities planned for ASTE ladies in Detroit for the annual meeting. They visited Greenfield Village, participated in a telecast of "Cinderella Week End," enjoyed a luncheon at the Detroit Boat Club and attended a number of parties. In charge of planning the ladies' program was a special committee headed by Mrs. Andrew Carnegie. She was assisted by Mrs. Michael Pinto and Mrs. Frank Curtis.



Present for the President's Dinner were Walter F. Wagner, Albert Sargent and William H. Smila.



Also attending the dinner were Wayne Ewing, H. L. Tigges, Thomas J. Donovan, Jr., and Les Hawes.

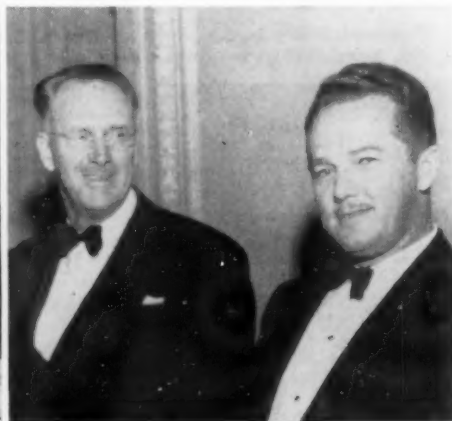
News Photos by Lens-Art



A. Goodwin and W. B. McClellan



H. C. McMillen and Ray Peterson



H. E. Collins and Harry B. Osborn

ANNUAL REPORT

American Society of
Tool Engineers

March, 1953



American Society of Tool Engineers
10700 Puritan Avenue, Detroit 21, Michigan

NATIONAL BOARD OF DIRECTORS

AMERICAN SOCIETY OF TOOL ENGINEERS



ROGER F. WAINDLÉ



LESLIE B. BELLAMY
Chairman



HARRY B. OSBORN, JR.



GERALD A. ROGERS



J. J. DEMUTH



T. J. DONOVAN, JR.



BEN J. HAZEWINDEL



GEORGE A. GOODWIN



W. B. McCLELLAN



FRED J. SCHMITT



WILLIS G. EHRHARDT

ANNUAL REPORT



LESLIE B. BELLAMY
President

PRESIDENT—Your administration during the past year has actively and vigorously promoted the professional interests of the Society and has brought to fruition many of the Society's projects. Chief among these and of which we are justly proud is the crystallizing of the Research Fund into an operating program with an appropriation of \$75,000.

The educational programs have received particular attention and encouragement from the administration. As an indication of the Board's long-range planning and the importance placed on these activities, the International Scholarship Awards have been increased from five to ten in number and from \$300 to \$700 each in value. Other activities received similar encouragement. Technical papers and programs for meetings have been carefully planned, the papers being selected for their usefulness to the membership and for advancing the profession of tool engineering. Attesting to the value of these contributions is the fact that they have been published widely and a large number of requests have been received from all over the world.

Recognizing that a growing and active society requires close cooperation between the chapter and national organization, the national officers visited all but a few chapters during the past year. In this way the needs of the chapters have been constantly studied and the maximum utilization of headquarters staff services made possible. As part of this program, the two-day Leadership Conference brought together all chapter chairmen, national officers and headquarters staff to mutually study and analyze the Society's needs and goals. This highly successful conference was the first of its kind in ASTE history, attesting the healthy and vigorous development of the Society and its awareness of the practical needs of the membership.

We are justly proud of the continuing growth of the Society. It is the fastest growing technical society in the world and is receiving increasing recognition for its high professional standards. The chartering of eleven new chapters and increasing membership by more than 4000 during the past year are unparalleled achievements which pay tribute to the solid foundation upon which the Society is founded. We can look forward with confidence that this growth will continue and that the Society will reach ever higher achievements in the years to come.

The following brief reports of our major activities indicate more fully the progress of the Society during the past year.

SECRETARY—Four officers' meetings were held during the past year. At these meetings, Society activities were reviewed for the purpose of coordinating them in order to present a unified report with recommendations to the Board of Directors. In this way, the Board is assisted in its policy decisions with respect to the extensive operations and programs of the Society.

Through the concerted efforts of the administration in making chapter visits and the excellent cooperation of chapter officers, the required minutes of chapter meetings are being received by headquarters. A chapter information sheet has been of immeasurable assistance in this program.

For continued closer relationship between the national governing body and all chapters, it is the policy of the National Officers that at least one officer should visit each chapter during the year. This program has been carried out insofar as practicable and every chapter, with but few exceptions has been visited.



HAROLD E. COLLINS
Secretary



HOWARD C. McMULLEN
Treasurer

TREASURER—A society is as strong as its financial position. Without adequate funds, necessary services cannot be provided for the membership. Our net worth is shown in the Balance Sheet in this report. Net worth of over \$725,000 represents an all-time high for the Society. Its increase during the past year was due primarily to our Industrial Exposition, THE TOOL ENGINEER and increased membership.

Sources of income for the Society and relative percentages during the past two fiscal years are shown in the pie chart accompanying the Balance Sheet. Similarly, Society expenses for the same period are also shown on a pie chart. In addition, these charts show the share of income and expense for each member based upon the average membership during the period.

Income from normal sources exceeded the income estimated a year ago. Expenses were held to the original budget fairly well although an increase in the budget of Functional and Technical Activities was authorized. The reserve for scholarship of \$50,000 has been invested in Series K, U.S. Defense bonds to provide income to partially finance the Society's scholarships. The reserve for research was increased to \$75,000 and transferred to the Research Fund. The emergency reserve was increased from \$200,000 to \$300,000.

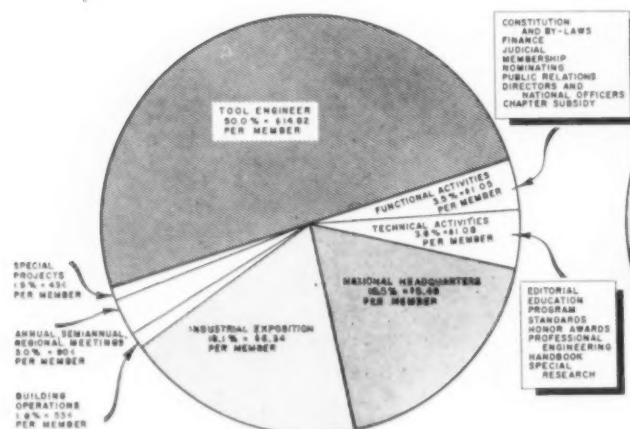
AMERICAN SOCIETY OF TOOL ENGINEERS **BALANCE SHEET** **AT FEBRUARY 1, 1953**

ASSETS	
CURRENT ASSETS	
Cash on Hand and in Banks	\$197,874.96
Accounts Receivable	12,409.48
United States and Canadian Bonds	307,998.12
Inventories	28,569.79
Total Current Assets	\$546,852.35
FIXED ASSETS	
Land	\$ 16,000.00
Land Improvements	6,529.01
Building	121,284.57
Automobile	2,671.49
Furniture and Fixtures	27,637.10
Total Fixed Assets	\$174,122.17
OTHER ASSETS	
Deposits with Others	\$ 1,466.86
Travel Advance	430.00
Accrued Interest	2,275.00
Deferred Expense — Tool Show 1954	271.00
Total Other Assets	\$ 4,442.86
Total Assets	\$725,417.38

LIABILITIES	
CURRENT LIABILITIES	
Accounts Payable Chapter	\$ 7,200.29
Accounts Payable Membership Pending	4,915.00
Accounts Payable Trade	1,584.30
Accounts Payable Suspense	62.10
Deposits Received	165.00
Accrued Agency Commissions	599.25
Prepaid Advertising	149.94
Federal Old Age Benefits	288.31
Awards Deposits	1,845.00
Total Current Liabilities	\$ 16,809.19

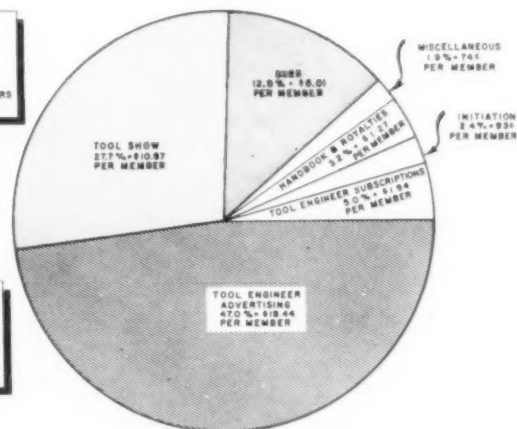
NET WORTH	
BALANCE OCTOBER 1, 1952	\$748,563.21
Deductions:	
Adjustment, including Donation to Research, \$75,000	77,350.00
Total	\$671,213.21
Additions:	
Excess of Income Over Expense	\$ 37,394.98
BALANCE FEBRUARY 1, 1953	\$708,608.19
Total Liabilities and Net Worth	\$725,417.38

EXPENSE—TWO-YEAR AVERAGE
(FISCAL YEARS ENDED SEPTEMBER 30, 1951, 1952)



OVER-ALL EXPENSE PER MEMBER = \$29.64

INCOME—TWO-YEAR AVERAGE
(FISCAL YEARS ENDED SEPTEMBER 30, 1951, 1952)



OVER-ALL INCOME PER MEMBER = \$39.20

Membership in The American Society of Tool Engineers pays multiplied dividends in the form of services beyond the invaluable contributions of technical information which advance the profession of tool engineering. As indicated in the pie chart for income, membership dues account for 13 percent of the Society's income. This means that over 750 percent has been returned in the form of services during the past two years. These services are represented in the expense pie chart by the various Society activities. On an individual member basis, the over-all Society income was \$39.20 and, on the same basis, the expenses were \$29.64 for the two-year period.

Averaged over-all grades, the individual member contributed \$5.01 to the national organization's income. In return, he received \$5.49 worth of various headquarter services, 43c in special projects, and 90c in annual, semiannual and regional meetings. In addition, national committees concerned with technical activities contributed their services for \$1.08, and the committees for functional activities required \$1.05 to perform their services. During this same period, each member received \$14.82 in value from **The Tool Engineer** magazine, and \$5.34 from the 1952 Tool Show in Chicago. Considered as an investment alone, membership pays high dividends!

with a goal of increasing it to \$500,000 to cover two to three years' expenses at our current activity.

Our financial health is excellent. We have a great responsibility to our members and past leadership to serve our best in the establishment and administration of financial policies.



GERALD A. ROGERS
Assistant Secretary-Treasurer

ASSISTANT SECRETARY-TREASURER—With the growth of the Society, effective operations of the various committees become increasingly important. The Society, like government and industry, is always faced with the problem of finding men to serve on its committees. Such men must not only be capable but must have the time and interest required. The function of the Assistant Secretary - Treasurer

is to maintain a record of availability of qualified members for the benefit of the officers and committee chairmen. Chapters are urged to submit recommendations and qualifications to their members who are willing to accept the responsibility involved in these appointments.

EXECUTIVE SECRETARY —

The past year has been an exceedingly good one for ASTE. In general, much of our progress is fundamental in character and, because of this fact, will be of benefit to the Society in the future.

Prospects for future membership and chapter status are most encouraging. The chapters have been extremely active during the past year and are doing a mighty fine job in servicing their memberships. Chapter programs have improved immeasurably and a wholesome spirit of cooperation is very much in evidence. This improvement has been responsible for arousing a great deal more interest in ASTE. The availability of the papers and their discussions have enhanced the prestige of the Society.

Since our Industrial Exposition in March, a complete report of attendance has been published and distributed to exhibitors, resulting in many favorable comments. Tentative arrangements have been made for the 1954 Exposition to be held at the Convention Hall in Philadelphia and indications are that it will be another outstanding success and will reflect credit to the Society.

An innovation in Society operations, the Leadership Conference brought together, for a two-day meeting, all the chapter chairmen, national officers, national committee chairmen and headquarters staff. Conducted as a forum, this meeting proved of immeasurable assistance to those engaged in the various phases of Society operation. Chapter chairmen were able to



HARRY E. CONRAD
Executive Secretary

discuss their mutual problems with the national officers and committee chairmen. The officers and committee chairmen outlined firsthand their programs, objectives and how the chapters could benefit from the many services rendered by headquarters. Never before had such an extensive program been planned for the benefit of our chapters.

Improvement is continuing in *THE TOOL ENGINEER* magazine and there can be no question but what this has been brought about by intelligent management and diligent application by the staff members. Not alone has the business side of the magazine improved but, in addition, there is a marked improvement in its editorial content. The member reaction to our magazine is most favorable and is basic to the success of our publication. The Society's two most tangible and valuable assets are its membership and its magazine and, as such, are given top priority in our plans.

THE TOOL ENGINEERS HANDBOOK continues to be a vital force in enhancing the prestige of the Society. Also, the new Die Design Manual program is progressing satisfactorily. The Committee has defined the scope of the project and material is being gathered for the contents.

FIRST VICE PRESIDENT —

Each of the national committees is under the jurisdiction of a national officer and each has its counterpart in the chapter organizations. It is the responsibility of the First Vice President to supervise the operations of the Program, Editorial, Public Relations, and Education committees. The objective of this organization is to coordinate the efforts of these groups in order that their operations may be more effective. Also, having a national officer directly responsible for a group of committees these committees are represented at the policy making level of the Society.

The national committees do a lot of work and planning but their services are only as useful as their counterparts in the chapters are informed and are able to employ them. This duplication in organization provides a direct channel for the best utilization of available material.



ROGER F. WAINDLER
First Vice President



J. O. HORNE
Chairman, National
Program Committee

PROGRAM—Plans for the 21st Annual Meeting in Detroit included 21 technical sessions, three panel discussions, one economic forum, and thirteen plant tours. These tours were organized to accommodate the varied interests of all who attended the meeting.

Bound volumes of the papers presented will be available as *TRANSACTIONS OF THE AMERICAN SOCIETY OF TOOL ENGINEERS*.

In view of the Board's desire to separate the Speakers' Directory from the Procedures, many technical speakers have been contacted and replies received regarding current listings in the new directory. This separate manual will be completely up-to-date, listing speakers who are currently available to the chapters, their subjects and company affiliation. Reports from chapters on their programs have proved valuable in providing leads for directory listings.

The program for the Southwest Area Meeting, held in Dallas, consisted of three technical papers, two plant tours, one panel discussion, and a science show. This general membership meeting presented an opportunity for asking questions and receiving answers from the National Officers present. An informal meeting of the participating chapter officers was also held with the national group. This meeting brought out lively discussions regarding chapter operation and had a stimulating effect.

The International Area Meeting was held in Buffalo in conjunction with the Semiannual Meeting of the Board of Directors. It is the committee's opinion that this type of area meeting be discontinued.

First of a series of prepared lectures is nearing completion. These lectures are being produced professionally in the form of a prepared narration accompanied by slides. They will be made available to chapters who might have program problems.



WAYNE KAY
Chairman, National
Editorial Committee

EDITORIAL — The National Editorial Committee has devoted particular attention to adequate participation on the part of ASTE chapters in the ASTE News section of *THE TOOL ENGINEER*. It has contacted each individual chapter editorial committee chairman. In addition, a practical program of follow-up by the editorial staff of the magazine has helped to increase chapter news. These efforts have been

profitable and there has been a definite increase in the number of chapters reporting.

A survey of readership, based on 1200 questionnaires, shows that there is a membership consciousness of the improved quality of technical articles. This survey has provided the staff with an insight into the type of information desired by the reader and will be highly useful in planning editorial schedules.

In conjunction with the National Standards Committee, the Committee instituted a new series of "Reference Sheets" which will appear regularly in *THE TOOL ENGINEER*. Also, member contributions to the Gadget section of the magazine have been actively solicited through the chapters.

Inasmuch as technical papers presented before meetings of the Society are available in the Society's Transactions, *THE TOOL ENGINEER* will abstract only selected papers and present them as soon as possible, consistent with editorial balance and coverage. The editorial staff has been increased by the services of another associate editor and by the addition of a full-time art editor.

EDUCATION — Through various educational media, efforts are aimed at raising the professional prestige of the Society. To accomplish this goal, a wide range of activities has been developed.

Curricula for colleges have been developed and are being employed to assist in the promotion of courses in tool or production engineering. Schools that have recently adopted options in this course include University of Michigan, University of Illinois, Ohio State University, Drexel Institute of Technology, and Utah State Agricultural College.

Curricula for technical institutes are being drafted and evaluated in order to develop programs leading to tool or production engineering education on an engineering aide level.

The Apprentice Training Program has been revised and is now ready for distribution. Programs of this nature require constant attention, research, study and revision to meet the ever-developing progress of industry and education.

Constant attention has been directed to our International Education Awards in order that the Society might gain the greatest good from this outstanding activity. As a result, colleges and universities have acknowledged the program. To take further advantage of this good will, awards are presented at the schools at the time they normally make such awards generally, with full publicity gained thereby.

PUBLIC RELATIONS — Of great importance to the individual member is the work of the Public Relations Committee in its effort to seek recognition for the tool engineer and to interpret the work of the Society to industry and to the public.

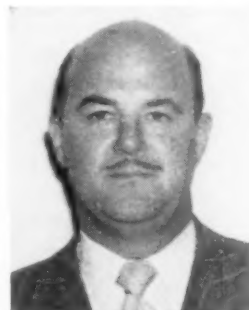
Through the efforts of our public relations counsel and our chapter committees, a steady flow of releases has been sent to both magazines and newspapers. As a result considerably more ASTE news stories have been published than ever before. Many of the news releases have been pinpointed to the Chapter town and have proved exceptionally effective. The trade press has given us wide coverage.

Worthy of particular mention is the award received by the Society from the American Public Relations Association. This award was made specifically for the outstanding publicity program executed for the 1952 ASTE Industrial Exposition.

A Checklist has been printed and distributed to the chapters for use in planning and reviewing effective methods and channels for publicity. Through the use of this Checklist, information and procedures for effective promotion may be taken which may otherwise be overlooked or not considered in time.



A. R. DIAMOND
Chairman, National
Education Committee



L. F. HAWES
Chairman, National Public
Relations Committee

SECOND VICE PRESIDENT —

A good Constitution with a suitable set of By-Laws and Procedures has been a vital factor in the healthy growth and operation of the Society. These laws and regulations must be kept constantly up-to-date to keep pace with the growth of and changes within the Society. Likewise, carefully planned standards that are kept up-to-date are of immeasurable help to the tool engineer and to industry. The committees involved in both of these activities are the Constitution and By-Laws Committee and the Standards Committee and are under the supervision of the Second Vice President.



JOSEPH P. CROSBY
Second Vice President

CONSTITUTION and BY-LAWS

—Review and proposed revision of the Chapter Procedures have been completed. Preliminary printing was made for distribution at the Leadership Conference. A great deal of work has also been accomplished in revising the National Procedures and in bringing them up-to-date with Board actions. Although carefully revised each year, where necessary, the Procedures have



E. H. RUDER
Chairman, National
Constitution and By-Laws

never had an over-all coordinated revision since their adoption in 1945.

STANDARDS—Standards provide industry with a tool, the use of which accomplishes tremendous savings in production and facilitates the work of the tool engineer. Actively participating in standardization work, the Committee has representation in the ASA Standards Council and the ASA Mechanical Standards Board. It also has representatives on eight ASA sectional committees.



R. C. PETERSON
Chairman, National
Standards Committee

These sectional committees of the American Standards Association include ball and roller bearings, allowances and tolerances for cylindrical parts and limit gages, small tools and machine tool elements, gears, wire and sheet metal gages, surface quality, classification of materials for tools, fixtures and gages and drawing and drafting room practice.

Two new sets of ASTE Data Sheets are in process. At the present time, since initiation of a reprinting program, there are 85 sheets being provided to new ASTE members.

THIRD VICE-PRESIDENT —

The life blood of any society is its membership. The interest and moral support of the members determine the activity and service that the Society can maintain. The Society, in turn, provides the engineer with an opportunity to broaden himself, to increase his personal effectiveness in industry, and to render a worthwhile service. The membership committee reports to the Third Vice President.



HARRY B. OSBORN, JR.
Third Vice President



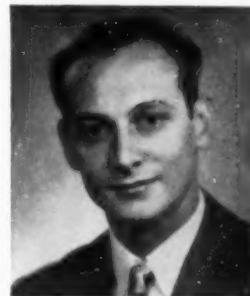
A. B. CLARK
Chairman, National
Membership Committee

MEMBERSHIP—Since March of last year the Society has gained 4,025 in net membership, an outstanding record making ASTE the fastest growing technical society in the world. Also, during the past year, eleven new chapters have been chartered. They are San Gabriel Valley No. 95, LaCrosse No. 96, Lima No. 97, Santa Clara Valley No. 98, San Fernando Valley No. 99, Northern Massachusetts No. 100, Keystone Chapter No. 101, Paterson No. 102, Nebraska (Omaha) No. 103, Louis Joliet Chapter No. 104, and Memphis No. 105. Phoenix Chapter No. 67 was reactivated in November.

The chartering of several other chapters is being considered in the following areas: Tucson, Arizona; Lansing, Mich.; and Knoxville, Tenn. Interest has also been evidenced in the following areas: Jamestown-Warren, Penna.; Fresno, Calif.; Hammond, Ind.; Little Rock, Ark.; Port Huron, Mich.; Muskegon, Mich.; and the Hawaiian Islands.

SPECIAL COMMITTEES

BOOK—Continued good sales of the TOOL ENGINEERS HANDBOOK confirm its value to the profession. Over 9000 copies have been sold during the past year, bringing the total sales to 40,890 in its third year of publication. Revision of the handbook is contemplated to start in the fall of 1953 and will require two years to produce what will virtually be a complete new edition.



F. J. SEHN
Chairman, National
Book Committee

The staff's work of writing the forthcoming DIE HANDBOOK continues at a steady rate. The Committee continues to review new material and to advise the staff on interpretation of difficult drawings and data.



C. M. SMILLIE
Chairman, Nat'l Professional
Engineering Committee

PROFESSIONAL ENGINEERING—Three major objectives of this Committee are: To promote the professional recognition of the tool engineer, to encourage and assist members in preparing themselves for becoming registered engineers, and to keep informed on the status of proposed legislation on national or state level, whichever affects the tool engineer.

Policies and programs were designed to present the responsibilities of the Committee and its objectives in a more convincing light to the chapters. As a result, the majority of chapters have appointed a Chairman for the Committee. Many coffee talks have been presented on professional engineering and chapter bulletins have contained articles on the subject. Also programs have been developed to provide chapter members with information on registration.

Other projects of the Committee include: Maintaining a library of all state laws on registration at National Headquarters, re-examining "The Model Law," and preparing a set of questions on tool engineering for presentation to State Boards of Examiners for use in examinations.

FINANCE—The Committee reviewed the financial policies of the Society as well as reports and budget requests submitted by the various committees at the Semiannual Meeting. No budgets were overexpended for the past fiscal year. The Committee chairmen and others concerned are commended for diligent adherence to the budgets as established and augmented during the year.



W. F. JARVIS
Chairman, National
Finance Committee

In October an estimated income of \$313,300 for the year was set up based upon 26,000 members by September 1953. In view of the steady gain in membership this figure is a reasonable basis for computation. Other incomes used in the estimate were based upon experience.

The balance sheet as of February 1, 1953 is printed with this report and reflects the good financial position mentioned by the National Treasurer.

HONOR AWARDS AND JUDICIAL—Awards for meritorious presentations of technical material before the Society through various media are currently in the formative stage. The Judicial Committee, composed of nine Past Presidents, renders final decisions regarding an interpretation of the Constitution and By-Laws in cases where interpretations of the National Committee are not accepted.

Petitions requesting decisions may be made by five members of the Board or twenty members of the Society. No matters of a judiciary nature have been brought before the committee during the past year.



W. H. SMILA
Chairman, Honor Awards
and Judicial Committees

RESEARCH FUND—With the election of permanent members of the ASTE Research Fund Committee at the Semiannual Meeting of the Board in October, the former Temporary Research Fund Committee was terminated with thanks of the Board for services rendered. Since its inception, the permanent Committee has held three regular meetings.

At these meetings, organizational plans, specifically offered research projects, and requirements of a full-time research director were considered. As the Committee continues to study the position of research in the Society's over-all objectives, it sees great possibilities ahead but is determined to act prudently in all deliberations and actions.



ROBERT B. DOUGLAS
Chairman, Protem
Research Fund Committee

CONCLUSION—Your Society is healthy, vigorous and growing. Progress during the past year as evidenced by this brief report has been eminently satisfactory. The Board expresses the Society's gratitude to the many national and chapter officers, committee chairmen, committee members, and all others who have contributed time and energies toward building a greater Society and rendering an ever more effective service to industry and the public.

Through personal contacts of the officers with the chapters during the past year, we have had firsthand evidence of the progress and accomplishments of the chapters as well as substantial proof of the vitality of our Society.

Submitted for and on behalf of the
Board of Directors and National Officers

L. B. Bellamy

Chairman of the Board

Society Tours Detroit Plants

Always a major attraction on ASTE programs, plant tours at the 1953 Annual Meeting attracted nearly one thousand Society visitors. Six industrial firms in the Motor City, five of them directly concerned with automobile manufacturing, put out the welcome mat for ASTE members. They were: Carboloy Dept., General Electric Co.; Rouge Assembly and Glass Plants, Ford Motor Co.; Forge Plant, Chevrolet Div., General Motors Corp.; V-8 Engine Plant, DeSoto Div., Chrysler Corp.; Plymouth Div., Chrysler Corp.; and Ternstedt Div., General Motors Corp.

A departure from similar programs in recent years, no speakers were scheduled the first morning of the three-day meeting, leaving members free to make plant visitations without missing a number of technical sessions. An industrial tour was included for ladies' activities for the first time when Plymouth was host to more than 50 ASTE wives for a luncheon and tour of assembly operations.



At Carboloy members stop to examine some of the powders involved in the powder metallurgical process of making tungsten carbide cutting tools.



Californians Ralph Chrissie, Arthur Crom, Peter Carter, John Stansbury, E. J. Raves and Wayne Ewing got together to take several of the plant tours.

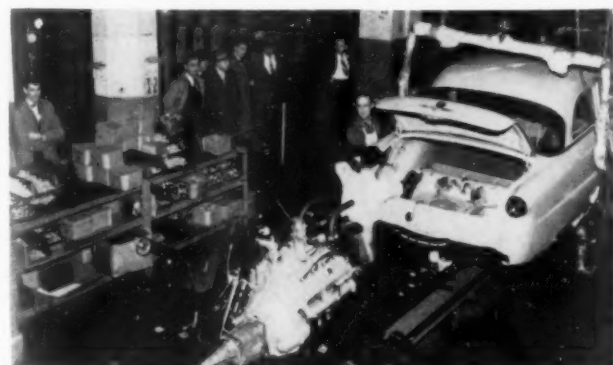


One of the many highlights of ASTE ladies' activities was the luncheon and tour sponsored by the Plymouth Div., Chrysler Corp., for more than 50 wives.



Two tours of the V-8 Engine Plant of DeSoto Div., Chrysler Corp., were offered so more visitors could see the "push button" plant at close range.

ASTE members observe the dropping of the body onto the chassis of a 1953 Ford passenger car on the final assembly line in the Dearborn Assembly Plant.



Plymouth also opened its doors for a plant visitation from the more technically minded representatives of the American Society of Tool Engineers.



J. H. Lengbridge of Aluminum Goods, Ltd., spoke on spinning vs. drawing.

ASTE Annual Meeting

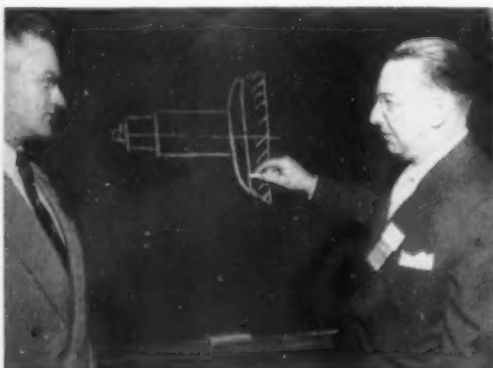
Papers presented by 22 production experts from every part of the country were heard by the hundreds of ASTE members who attended the technical sessions at the annual meeting. Most frequently heard comment was the repeated emphasis on the need for more engineers to serve all phases of industrial pro-



R. L. McWilliams, center, reviews his talk for **Walter Wagner** and **Monta Cox**.



Discussing thread production (from left) were: **S. W. Lovejoy**, **Otto Hoelzel**, **O. E. Kochler**, **R. S. Holmes**, **F. J. Hudson**, **A. B. Reed**, **A. H. Bailey**.



Ralph E. Cross, right, illustrates a point for **Chairman William Grier**.



Pictured at the session on production uses of adhesive-bonded joints are: **William L. Emerson**, **O. W. Loudenslager**, **J. H. Gerstenmaier** and **Fred Foote**.



O. C. Turchan, with **Chairman David Heath**, left, spoke on automatic control and the machine tool.



P. F. Rossman, left, introduced the session which featured a talk by **Dr. George Sachs** of Syracuse University.



Moderator of the panel on super-finishing was **A. M. Swigert**, left, shown with **Frank W. Curtis**.

Technical Speakers

duction, from research to the finished product. At a special forum which featured outstanding educators and industrial executives, particular attention was devoted to America's impact on the standard of living and the nation's role in improving the standard of living all over the world.



J. H. Paquin, left, demonstrates his feeding device for Arthur Parker, Sr.



J. B. Carse of S. C. Johnson & Son, Inc., right, discussed the topic "Wax Lubricants in Metal Working" at a session conducted by F. L. McKeen.



E. O. Dixon, left, answers a question asked by Chairman G. F. Daschke.



Two of the participants on the honing and lapping panel were: H. I. Sole, Crane Packing Co., and D. T. Peden, Micromatic Hone Corp.



R. A. Atkins, left, introduced the program given by Dr. R. C. Gibbons.



W. L. Kennicott, chief engineer, Kennametal, Inc., presented a paper on Titanium Carbide Alloys.



"Developments in Electrolytic Grinding" was discussed by L. G. Metzger, president, Super-Cut, Inc.



G. C. Lawrie of Tinius Olsen Testing Machine Co. spoke on the subject, "Precision Production Balancing."



John C. Obermeyer, left, retiring chairman of the Racine ASTE chapter, presents the service award pin to Reginald O'Connor, treasurer for 1952-53. Mr. Obermeyer also installed the following officers: Wally Swan, chairman; Morrice Otto, first vice chairman; Robert Freres, second vice chairman; Alvin Michna, secretary; Laverne Hicks, treasurer. The ceremonies took place at the Ladies' Night meeting held on March 2.

Wiederman and Montoya Receive Atlanta Awards

Atlanta—The March 16th meeting of Atlanta ASTE chapter was highlighted by the installation of officers for the coming year and the presentation of service pins for meritorious work within the organization. Nearly 60 members attended the session held at Peacock Alley.

Officers installed were: Charles Toney, Jr., chairman; Gene F. Scarborough, first vice chairman; Victor Montoya, second vice chairman; John Anderson, secretary; and Jim Ealy, treasurer.

Service pins were presented to James F. Wiederman and Victor Montoya for their tireless efforts in conducting the recent campaign, in which the membership of the Atlanta chapter was increased by approximately 30 percent.

The guest speaker of the evening, John C. Kosky, Director of Public Relations, Wales-Strippit Corp., North Tonawanda, N.Y., discussed the subject "Modern Methods of Hole Punching and Notching."

He pointed out the features of versatility and quality inherent in die sets designed and manufactured by his company—the advantages that accrue from their use.

Perhaps tantamount to the main theme, but creating wide interest, was the use of slides in discussing other Wales-Strippit products such as: the universal fabricating machine, precision drill, twin column punch press, and contour shear.

—Joe L. Morris

West Coast News

By Andrew E. Rylander

Invited to Santa Clara Valley chapter, March 17, to participate in the installation of the incoming officers, I found an overflow gathering of tool engineers and guests at the De Anza Hotel, San Jose, come to hear Dr. W. R. Frazer of Union Twist Drill Co. talk on "What's New in Cutting Tools." Might add here that my "participation" consisted mainly of looking natural and turning over a batch of copies of THE TOOL ENGINEER to Carl Kaiser, heading the course in tool engineering at San Jose State College.

I had previously met Charles Peterson, Prex of Union Twist Drill, while on a visit in San Francisco, so had pleasant anticipations of the meeting with the speaker. At that, I was a bit shy, meeting a guy with all them degrees, but Doc put me at ease right away by saying that he knew all about my notoriety a/c, having read my monthly news letters. And him all the way from Massachusetts!

Carl Horack, dean of the Bay Area tool engineers, swore in the incoming officers: Bud Weaver—in a green tie—standing in for Ch'man Bill Lanyon, gone to the Annual; George Randolph and Don Locke, 1st and 2nd vice chairmen in that order; J. T. McCarthy, sec'y; and W. T. Wright, treasurer. A bunch of live wires that will nevertheless have to travel to keep pace with their predecessors. Vincent Diehl and his aides really did a job!

Ware Gets Service Award

A deserved tribute was paid Bill Ware, who was presented a pin in recognition of his fine work in organizing the chapter. Bill, who missed out being secretary when the chapter was chartered because of being transferred, had come all the way from San Gabriel, where, from what I gather, he is making good in a big way. A fine chap! Bud Weaver, too, came in for an award for meritorious service.

The following night I attended Golden Gate chapter's meeting, held at the El Curtola Restaurant in Oakland. There, to my delight—to everybody's delight, for that matter—I met A. H. d'Arcambal, veep and gen. sales mgr. of Pratt & Whitney Div. and, without question, one of the best-liked men who ever graced the presidency of the ASTE. After some mutual admiring, we decided that we both looked fine.

What with Ted Rohrer, presiding; E. P. Haquette, district manager; Ed

Dorau and Bob Brown, all of the P and W San Francisco branch, Pratt & Whitney was pretty well represented. In a way, I sort of felt that I belonged too, having been a toolmaker at P & W long before a couple of the group were a bare gleam in their daddies' eyes. Oh Time, what's your hurry!

d'Arc officiated at the installation of the incoming officers, at which Walter Gustafson—Marchant production engineer—stood in for Dave Gustafson, chairman-elect who also was at the Annual. Didn't quite get the relationship—grandfather, grandson or uncle, according to d'Arc—but Walt looks like a good guy to go fishing with. Rounding out the slate was Dean Roulund, Vern Gallichotte, Ted Lindquist and Ray Reed, 1st vice chairman, 2nd vice chairman, sec'y, and treasurer in the order named. All good men, experienced in chapter work.

New Peak in Membership

Golden Gate hit the 300 mark in membership, the 300th being Alfred Deaklin, lately in from Detroit and now operating the Ace Tool & Engineering Co. in Oakland. To that, add the 165 membership in Santa Clara Valley chapter—and both growing—and it becomes apparent that the ASTE is pretty well represented in the Bay area. Watch us grow!

Looking around, I noticed a number of men whom I had seen at the Santa Clara meeting the previous evening, among them Jim Stafford of Union Twist Drill and Joe Rodecker of Whitman & Barnes among "competitors." Can't quite figure out whether they were so enthralled with Doc Frazer's melodious oratory that they followed him the way the kids followed the Pied Piper, or were just trailing along to make sure he didn't slip one over.

In introducing Dr. Frazer, Ted Rohrer apologized for a typographical error in the meeting bulletin—Othol instead of Athol—at which some wag piped up: "Athol right!" As a speaker, Dr. Frazer is tops, handled a highly involved and technical theme so lucidly that he maintained interest from start to finish. Sure, he had to take some kibitzing, especially from that other master metallurgist d'Arcambal, but it was all in fun as between friends and only livened the more one of the most interesting meetings I've attended since coming out to the Coast. And that's all for now.

New Chapter Leaders Take Office in March

Hamilton officers being sworn in, from left: Clarence E. Bulmer, chairman; John M. Snyder, first vice chairman; Frank C. Johnson, second vice chairman; J. A. Sheldon, third vice chairman; H. B. Ward, secretary; W. A. Dawson, installing officer; and R. G. Fechnan, treasurer.



Ben J. Hazewinkel, far right, a national director of ASTE, installed Los Angeles officers: Ralph L. Chrissie, delegate; Paul E. Lenk, secretary; Frank X. Bale, treasurer; Paul Slater, second vice chairman; J. E. Riddle, first vice chairman; and Carl L. Ahnquist, chapter chairman.



New officers of the Twin States ASTE chapter are: Glenn Easton, treasurer; Carl J. Cameron, second vice chairman; George Julian, chairman; Martin Parker, first vice chairman; and Edward Brown, secretary.



Pat Pecoraro, far right, past chairman of the Elmira chapter, presents the chairman's pin to Ed Bates at the installation of officers. Others pictured: Ray Banfield, delegate; Mike Buffalin, treasurer; Arthur Green, secretary; Henry Le Maire, alternate delegate; Francis Shepherd, second vice chairman; Charles Roe, first vice chairman.

Installation officer for the Worcester chapter was Victor H. Ericson, back to camera. Receiving the oath of office are: Ralph Baker, alternate delegate; E. Roland Ljungquist, delegate; Andrew Peterson, treasurer; J. Irving England, secretary; Adam T. Kosciuszko, second vice chairman; Louis J. Furman, first vice chairman; and John E. Rotchford, chairman.



New Editors Join Tool Engineer Staff

Two recent appointments to the editorial staff of *THE TOOL ENGINEER* have been announced by John W. Greve, editor of the magazine. Ralph Eshelman has been appointed associate editor, a newly created position, and Michael Babala has been named art editor of the publication.

Mr. Eshelman, a graduate of Wooster College, was formerly editor of engineering publications, Ford Motor Co., Dearborn, Mich., where he supervised preparation of drafting, engineering and test manuals. As procedures analyst, he developed engineering and administrative procedures for the company.



Ralph Eshelman



Michael Babala

For more than three years Mr. Eshelman served in various production and technical writing capacities at Good-year Aircraft Corp., Akron, Ohio. He was also associated as a body engineer with Reo Motors, Inc., in Lansing, Mich. He has published a number of technical articles in national publications during the past seven years.

Mr. Babala has been named art editor of the magazine, replacing Robert Stei-

New Monthly Bulletin for Dayton Members

Dayton—At the March installation meeting, National Director G. A. Goodwin administered the oath of office to those Dayton ASTE members who will be in charge of 1953-54 activities. Retiring Chairman R. M. Blair turned over the gavel to R. A. Miller who conducted the meeting.

The new magazine type monthly bulletin was presented by Roy J. Dusseau, first vice chairman, and Mr. Miller. It received the enthusiastic approval of the membership.

Robert H. Groman, midwest sales manager, Eutectic Welding Alloys Corp., was the technical speaker. He discussed salvage of broken tools and dies, supplementing his talk with slides.

—W. J. Killinger



Past President A. H. d'Arcambol, left, installed the new officers of the Golden Gate chapter at the March meeting. Being sworn into office are: Walter Gustafson, acting as a proxy for Chairman Dave Gustafson; L. Dean Rouland, first vice chairman; Vernon Gallichotte, second vice chairman; Ted Lindquist, secretary; and Raymond Reed, treasurer. The service pin was awarded to Henry De Coursey for his work as instructor of the tool engineering course sponsored by the Golden Gate chapter. Another highlight was the awarding of the chapter's 300th membership pin.

ger who resigned to devote full time to his art studio. Mr. Babala was formerly a staff artist with Evans-Winter-Hebb, Inc., Detroit advertising and printing firm. He is a graduate of Meininger Art School in Detroit. As a member of the Detroit Photographic Guild, Mr. Babala has exhibited his work throughout the United States and South American countries.

William Hebert Wins Twin States Award

Springfield, Vt.—The 1952 award for the most outstanding service to the Twin States chapter was presented to William Hebert at the March 11 installation meeting. Chairman George Julian made the presentation.

Twin States officers for 1953-54 were installed by Past Chairman Lee Davis. The meeting was also the occasion for the chapter's annual punch bowl party and was attended by close to 70 members and guests. Entertainment was furnished by James Joyce of Boston.

—Stacey C. Farrell

Editorial Chairman Receives Service Award

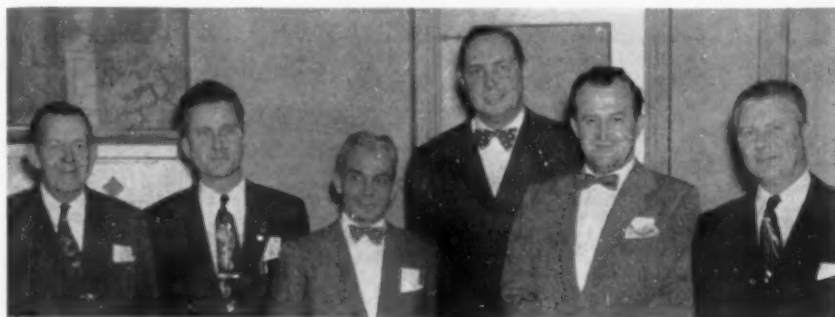
Brantford, Ont.—Installation officer at the March 13 meeting of the Hamilton District chapter was William Dawson. About 60 members and guests were present for the ceremonies.

Retiring Chairman William Shaw gave his annual report and told of the activities and accomplishments of the chapter during the past year. He presented the service award pin to John Litwin for his work as editorial chairman.

The chairman for 1953-54, Clarence Bulmer, was presented a gavel donated to the chapter by students at the Delta Secondary School.

The technical program was introduced by George Gilmour. Guest speaker was Harry L. Stewart, assistant sales manager, Logansport Machine Co., Logansport, Ind. He spoke on fluid power in action, outlining the typical hydraulic system and discussing the relative importance of each element. His lecture was followed by a question and answer period.

—John Litwin



Dayton officers for the coming year were installed at the March meeting by George A. Goodwin, far left, a national director of ASTE. Pictured with him are: Richard A. Miller, chairman; Roy J. Dusseau, first vice chairman; Victor Boll, second vice chairman; Francis J. Heberling, secretary; and Warren J. Braun, treasurer.

William Dawson Installs Grand River Officers

Galt, Ont.—William Dawson, a past national director of ASTE and a past chairman of the Hamilton chapter, installed the new officers of the Grand River Valley chapter at the March meeting. Heading the group is John Ward, chairman; Percy Barber, first vice chairman; Selwyn Pritchard, second vice chairman; Clayton Henderson, third vice chairman; Alan Lambert, secretary; and Carl Hawley, treasurer.

Retiring Chairman David McCready congratulated the new officers and presented the annual report to the chapter.

Slides and a movie produced for Cincinnati Milling Machine Co. were shown at the technical session by W. R. Turner. They pictured in detail the cutting action of tools under various conditions. Another film on the atom bomb told of the precautions to be taken during an atomic attack. It was sponsored by the John Lallatt brewery.

A buffet luncheon and social hour concluded the meeting, which was attended by more than 100 members and their guests.

—W. C. Little

Elected Vice President of Lovejoy Tool Co.

Gerry T. Attridge, formerly general manager of Lovejoy Tool Co., has been elected vice president of the company. Mr. Attridge, who has been associated with Lovejoy since 1946, is a member of the Society's Twin States chapter in Springfield, Vt.



Grand River Valley ASTE officers were installed by William Dawson, far left, a past national director of the Society and a past chairman of the Hamilton chapter. From left: Jack Ward, chairman; Percy Barber, first vice chairman; Clayton Henderson, third vice chairman; Alan Lambert, secretary; and Carl Hawley, treasurer.

Charter Chairman Installs New Officers

St. Catharines, Ont.—C. D. Wright, charter chairman of the Niagara District chapter, came from Toledo March 5 to conduct the installation of the new officers for 1953-54. The inauguration meeting was held in the Elizabeth Room at the Queensway Hotel.

After the ceremonies, the chapter heard a technical lecture on "Carbide Cutting Tool Application" by W. P. Comney, general superintendent of Rice Barton Corp., Worcester, Mass. Hosts for the evening were International Machinery Co., Ltd., and the International Electric Motor Co. of Hamilton.

The February meeting of the chapter was held at Thompson Products and served as the annual Ladies' Night program for the group.

—William Yaeger and E. Lindwall

Hazewinkel Conducts Los Angeles Installation

Los Angeles—National Director Ben J. Hazewinkel installed officers of the Los Angeles chapter at the March 12 meeting held at Scully's Cafe. About 215 members and guests were present for the ceremonies.

The chapter's service pin was awarded to S. W. Winquist for his excellent work as education and training committee chairman. A technical lecture was presented by Dr. W. R. Frazer, chief metallurgist with the Union Twist Drill Co.

The election meeting, held February 12, was highlighted with a visit by L. B. Bellamy, 1952-53 president of ASTE. He told the chapter of the urgent need of more engineers in the field of politics and discussed the current activities of the Society.

—S. H. Parsons, Jr.



Shown at the Peoria installation, from left, seated: J. P. Crosby, ASTE first vice-president; Chairman Ray Zimmerman, (standing) Second Vice Chairman Wilbur McWilliams, Secretary Leo Johnson, First Vice Chairman Vic Schell-Schmidt, and Treasurer Bill Bahnfleth.



Technical speaker at a recent meeting of the Windsor chapter was Wallace A. Stanley, center, assistant to the president, Progressive Welder Sales Co., Detroit. Pictured with him are John Roe, left, sales engineer for the firm, and J. F. Johnson, first vice chairman.



Officers and committee chairmen who will be serving the Indianapolis chapter for the coming year got together for a group picture at their last meeting. Seated, from left: Lloyd Refer, secretary; Ted Harding, second vice chairman; Joe Penn, chairman; Joseph Enright, first vice chairman; and Lloyd Turner, treasurer. Standing: Red Bussell, programs; Harold Evans, standards; Bryon Confer, membership; John Huser, editor; Richard Garber, reservations; Prof. Halsey Owen, professional engineering; Murray Davidson, advertising; and Marshall Rosenbarger, editorial. Not pictured: Denis White, delegate; Phil Brown, reception; Donald Steel, associate editor; John Horton, advisory; Roy Erickson and Larry Sterns, programs.

Prof. Owen Honored For ASTE Service

Indianapolis—Prof. Halsey Owen of Purdue University received the service award of the Indianapolis chapter for his extensive work in making state examinations for licensed engineering available to tool engineers. The award was made by the chapter's new chairman, Joe Penn, in the absence of Denis White, chairman during 1952-53.

Mr. Penn and other chapter officers were installed by E. W. Hilkenbach, a past chairman. The ceremonies took place March 5 at a dinner meeting at the Sahara Grotto. About 120 members and guests attended.

The technical lecture was presented by G. H. Stimson, sales manager and chief engineer of the gage division of Greenfield Tap & Die Corp. He spoke on screw threads and taps and showed a colored movie to illustrate his material. An extensive discussion period followed the program.

—Marshall B. Rosenbarger



Shown at the installation meeting of the Wichita chapter, left to right: Orville Strahm, retiring chairman and chapter delegate; A. A. Reddy, new chairman; R. O. White, first vice chairman; James H. Janson, second vice chairman; Norman Watkins, secretary; and Paul R. Hess, treasurer. Installing officer was M. M. Ross, 1943 chairman of the chapter. The ceremonies took place at the March 11 meeting held at Wolfe's Cafeteria.

Roy White Presented Wichita Service Award

Wichita—The award for outstanding service to the Wichita chapter during 1952 was presented to Roy O. White, retiring secretary, at the March installation meeting. A. A. Reddy, 1953-54 chairman, received the chairman's pin from Orville Strahm, outgoing chairman of the chapter. Some 75 members and guests witnessed the ceremonies.

The scheduled speaker, Walter R. Dawson, field engineer, Ward Leonard Electric Co., was unable to attend the session, but his paper on industrial hard chrome plating was read by Harold Bales, last year's program chairman. He explained how steel shortages during World War II prompted rapid advances in improving cutting tool life. Modern plating processes have solved many tooling and production problems by increasing output and lowering costs.

A demonstration was given showing the ease of chrome plating with the new method.

—John G. Temple



San Diego ASTE awards for outstanding service to the chapter were presented March 10 at the installation meeting held at the El Morocco Club. Recipients were Clarence Boyle, far left, and Past Chairman Manino, center. Pictured with them are Arthur E. Crom, who was re-elected chapter chairman, Clyde C. Good and William Keller. Among the officers who were installed at the meeting were M. R. McClure, first vice chairman; Mr. Boyle, treasurer; and Kenneth R. Neers, secretary.

Dr. Frazer Speaks On Cutting Tools

San Diego—Dr. W. R. Frazer, chief metallurgist, Union Twist Drill Co., spoke at a joint meeting of the San Diego chapters of ASTE and ASM held March 10 at the El Morocco Club. He presented a discussion of cutting tools.

The officers of the ASTE chapter were installed at the session and the service award was presented to Clarence F. Boyle for his outstanding work as treasurer in 1952-53.

—William Keller



National Director G. A. Rogers, far left, was the installation officer for the Toronto chapter. New officers are, from left: Eric Browne, treasurer; Cliff Farr, first vice chairman; David Few, chairman; Bruce Fairgrieve, second vice chairman; W. H. Weatherhead, third vice chairman.

Jesse George Receives Hartford Chapter Award

Hartford—The March meeting of the Hartford ASTE chapter featured dinner at the City Club, installation of officers, presentation of the service award to Jesse George for his outstanding record in obtaining new members for the chapter, and a technical session in the auditorium of the Gas Company. Over 225 members and guests were present.

The coffee talk was made by Raymond Choate who told about the "Citizens for Safety" movement to reduce the nation's high traffic accident rate. Goal of the non-profit campaign is to enlist the voluntary pledges of individuals to urge safe conduct on the highways.

"Precision Tumbling" was discussed at the technical session by N. Lee Watkins, Almco Div., Queen Stove Works, Albert Lea, Minn. He reviewed the principles and theories of the tumbling or barrel finishing processes and the controls necessary to achieve precision tumbling. Control of barrel load, barrel speeds, make-up of grinding or burnishing aggregate, solution compounds and water were covered in relation to their effect on the finished product.

—John Hand Conard

Monta Cox Appointed Chief Sales Engineer

Monta O. Cox, owner of the Cox Engineering & Sales Co. in Detroit, has been named chief sales engineer of Flodar Corp., Cleveland, O. He previously served as Michigan representative for the firm, and in his new position will be in charge of sales and distribution in the United States.

A past chairman of the Detroit chapter of ASTE, Mr. Cox has enlarged his Detroit staff enabling him to handle the increased responsibilities for the Cleveland firm. He is an active member of the Engineering Society of Detroit and the American Society of Lubrication Engineers.

Named Vice President of Sahlin Engineering Co.

Francis J. Sehn, chairman of ASTE's National Book Committee and former Detroit district sales engineer for the Clearing Machine Corp., has been appointed vice president in charge of sales of the Sahlin Engineering Co., Birmingham, Mich., designers and manufacturers of unloading devices and other automation equipment.



F. J. Sehn

Previously, Mr. Sehn was associated with E. W. Bliss Co. as sales engineer and with Fisher Body Div. of General Motors Corp. as chief die engineer of the tank division during World War II. A registered engineer, Mr. Sehn is a member of the Engineering Society of Detroit and the Society of Automotive Engineers.

Rogers Installs Toronto Officers

Toronto—New officers of the Toronto chapter were sworn into office at the March meeting by Gerald A. Rogers, a national director of ASTE and assistant secretary-treasurer for 1952-53. The meeting was held March 4 in the Oak Room of the Union Station. About 160 members and guests attended.

Mr. Rogers reported on the progress and growth of the Society as a whole and brought the Toronto members up to date on national aims and accomplishments of ASTE.

A talk by Cliff Farr, currently first vice chairman of the Toronto chapter, was featured at the technical session. He spoke on justification and development of special purpose machines. Illustrated with slides, the discussion emphasized the importance of careful consideration of all factors before deciding on special machines rather than standard machines or standard machines with special attachments.

"A special machine is justified," said Mr. Farr, "only if it fulfills one or more of these requirements: decreases costs, improves quality, performs an operation not possible on a standard machine, or reduces fatigue."

—A. McKinney Rice

Kenneth Yonker Presents Fort Wayne Program

Fort Wayne—Newly elected officers of the Fort Wayne ASTE chapter were sworn into office at the March 11 meeting. Dinner preceded the ceremony and featured a talk by James Adams of the Indiana Toll Road Commission. More than 80 members and guests attended.

The technical speaker was Kenneth Yonker of the Howard Foundry, Milwaukee. His subject was "Investment Castings." He discussed the lost wax process and the mercury process. A color movie illustrated the talk.

—Richard Spaw



Ralph Didier, past chairman of the Fort Wayne chapter, far left, swears in the new chapter officers at the March meeting. Pictured with him, from the left, are: Eugene Gildea, Jr., Donald Welbaum, Blaine Garard, Harry Hartman and Charles Hauk. A technical discussion on investment castings was presented at the session by Kenneth Yonker, Howard Foundry, Milwaukee. Coffee speaker was James Adams.

Michael Pinto Heads Detroit ASTE Officers

Detroit—New officers of the Detroit ASTE chapter were installed March 12 by William Smila, a past president of the Society. The event was coupled with the group's annual Ladies' Night.

Detroit activities will be guided during 1953-54 by the following members: Michael Pinto, chairman; Stanley Phillips, first vice chairman; Charles W. Ward, second vice chairman; Lenard B. Lovings, third vice chairman; Carl S. Abbott, secretary; and Rudolph W. Andreasson, treasurer. The chapter's service award was presented to Jack Wagus for his outstanding contributions to ASTE the past year.

Appointments of committee chairmen include: William G. Shaw, Joe A. Brust, Anthony Rogers, George R. Squibb, Fritz Fiesselmann, Robert Rheinhardt, Leonard Joseph, Charles M. Gasser, Charles C. McKenna, Gordon N. Cameron, Clyde Mooney, Carl Oxford, Jr., Richard Macon, David Kauffman, Walter R. Schober, Henry Schlachter, Matthew G. Rumora, C. M. Smillie, Charles Buttiger and Thom Need.

Program speaker at the meetings was W. A. Paton of the School of Business Administration, University of Michigan, Ann Arbor. He spoke on "Shirt-Sleeve Economics."

At the March educational program, "The Use of Electrical Strain Gages in Dimensional Measurement" was discussed by E. L. Watelet, director of de-



Michael Pinto, right gives radio to Retiring Chairman Ed Wiard.

sign, Precision Tool Div., Brown and Sharpe Mfg. Co., Providence, R.I. Using slides for illustration, Mr. Watelet presented the requirements for a suitable measuring element of high sensitivity, linearity, stability or freedom from drift, freedom from thermal effects in the element itself, low operating pressure, a low spring constant and a simple rugged design of small physical dimensions.

He described the Brown and Sharpe electronic measuring equipment and told his audience how it was designed and developed.

The Carbide Section of the Detroit chapter met March 5 to hear a talk by William J. Kallio, chief engineer, Latrobe Steel Co., Chicago office. This subject was entitled "Drilling with Carbide."

—Anthony C. Panfil and Walter Schober

Robert Douglas Conducts Montreal Installation

Montreal—New executives of the Montreal chapter were sworn into office March 12 by Robert Douglas, a past president of the Society. Leading chapter activities for 1953-54 were: C. A. Gareau, chairman; T. C. Hill, first vice chairman; T. J. Tracey, second vice chairman; J. M. Masse, third vice chairman; G. L. Nashman, secretary; and J. H. Currie, treasurer.

The technical program was presented by Bruce Lewis, engineer, Tinius Olsen Testing Machine Co., Ltd. He spoke on "Servo-Mechanisms in Testing."

—George Henderson

Retiring Chairman McDowell of the Montreal chapter congratulates C. A. Gareau, 1953-54 chairman.



Conrad Conducts Chapter Installation

Newark—At a dinner meeting held at the Robert Treat Hotel on March 10, the new officers of the Northern New Jersey chapter were installed by Harry E. Conrad, executive secretary of ASTE. They are: William E. Wheaton, chairman; R. Wilson Ryno, first vice chairman; Alexander S. Hylicke, second vice chairman; Arthur J. Wotowicz, secretary; and John Wanolik, treasurer.

Toastmaster for the evening was Andrew Anderson, vice president in charge of manufacturing, Monroe Calculating Machine Co. The major address was delivered by George C. Cahse, director of Basic Research, Monroe Calculating Machine Co. He spoke on the history of mechanical computing machinery.

Committee appointments for the year put the following men in charge: Andrew G. Kavolick, constitution and by-laws; Anthony F. Cuoco, editorial; Robert Reede, Jr., membership; Herbert Dietrich, standards; Walter Wunderlick, public relations; Michael Scuduto, education; Carl L. Slonkosky, N. James Bosted and T. Eigo, entertainment; and A. Grano, plant coordinator.

—Anthony F. Cuoco



Past Presidents L. B. Bellamy and J. J. Demuth proudly display the award made by the American Public Relations Association for outstanding public relations achievement by ASTE in connection with its 1952 Exposition. The material on which the award was based was submitted by Denham & Company. It is the first award made by APRA to a professional association.

William Lanyon Heads Santa Clara Officers

San Jose—Officers of the Santa Clara Valley chapter were installed at the March meeting held at the De Anza Hotel. With William Lanyon as chairman, they include: George Randolph, first vice chairman; D. D. Locke, second vice chairman; John McCarthy, secretary; and William Wright, treasurer. The ceremonies were witnessed by about 150 members and guests.

The service award was made to William Forbes for his outstanding work the past year. William Ware, one of the founders of the chapter, traveled 400 miles to attend the meeting and present the past chairman's pin to Vincent Diehl.

Mr. Diehl gave the chapter an album to be used as a perpetual history to record names of members and guests and noteworthy events of Santa Clara Valley activities.

Appointments of committee chairmen were announced. Heading the various groups are Carl Kaiser, Frank Menard, E. F. Roscowski, Lawrence Cook, Alan Dimond, Clyde Byington and Glenn Herreman.

On February 13 officials of the Santa Clara Valley chapter met with L. B. Bellamy, Ben Hazewinkel, Leslie Hawes, and Wayne Ewing, all national ASTE officers during 1952-53, and members of the executive committee of the Golden Gate chapter. They covered various phases of Society activities, including the Leadership Conference, the Industrial Exposition, and THE TOOL ENGINEER magazine.

At Santa Clara Valley's regular chapter meeting in February, members elected new officers and heard a discussion by Bruce Craver, manager of the industrial division of the San Jose Chamber of Commerce.

—E. Reed and Glenn Herreman

Membership Chairman Honored for ASTE Service

New Haven—Stanley Porritt received the service award of the New Haven ASTE chapter for his outstanding work as head of the chapter's membership committee and fine handling of the campaign which brought in more than thirty new members. Retiring chairman John Alton made the presentation.

The installation meeting was held March 12 at the Hotel Garde. About 50 members and guests were present. Fred Dawless conducted the ceremonies.

William H. Gourlie, standards engineer, Sheffield Corp., Dayton, O., was the guest speaker. He spoke on air gaging and told how it has helped to solve many production problems.

—Silas W. Becroft



National officers of the Society met recently with executives of the Golden Gate and Santa Clara Valley ASTE chapters. Shown here, from left: Les Hawes, Ted Rohrer, L. B. Bellamy, Vincent Diehl, Ben J. Hazewinkel, Wayne Ewing, and William Lanyon.



Dr. Harry B. Osborn, Jr., second vice president of ASTE, conducted the installation for the Des Moines chapter in March. Sworn into office were: Gene Scanland, secretary; Paul Wahlund, treasurer; Fred McMaster, chairman; and John Hug, first vice chairman.



Gene Roth, third from left, retiring chairman of the Greater New York chapter congratulates the new chairman, Hartley W. Barclay. Other officers are: G. W. Compter, second vice chairman; Florence Daniels, treasurer; William Reber, first vice chairman; and Julius Willy, secretary.



Retiring Chairman John N. Alton, second from left, hands the gavel of the New Haven chapter to Emmanuel E. Luw, 1953-54 chairman. Other officers are: N. C. Gilbert, second vice chairman; G. G. Griffiths, treasurer; Stanley Porritt, secretary; and John S. Brozek, first vice chairman.

Potomac Meeting Draws 160 Members and Guests

Washington, D.C.—Installation ceremonies for the Potomac chapter were held at the March meeting at the Hamilton Hotel. The dinner session, held in Chantilly Room, was attended by about 160 members and their guests. The evening's festivities began with a reception followed by the banquet.

Retiring Chairman William E. Jones administered the oath of office to: George Beck, chairman; William F. Heffernan, first vice chairman; Wayne L. Boyer, second vice chairman; Albert F. Schockey, secretary; and James M. Cole, treasurer.

Mr. Beck introduced the appointed officers who will serve as chairmen of the various committees: William E. Jones, advisory; Leon L. Crosby, public relations; F. E. Bellin, editorial; Walter E. Larson, education; Robert E. Bear, program; Milton R. Yancey, meeting; Roderick D. MacDonell, entertainment; Joseph E. O'Neill, standards; Hugh L. McLeod, constitution and bylaws; Austin I. Christman, membership; Edward H. Nunnally, reception; and John A. Penn, professional engineering.

—F. E. Bellin

Discusses Tool Design

Salt Lake City—Some 60 members of the Salt Lake City ASTE chapter attended the February election meeting held at the Tower House Coffee Shop. After the voting was completed, a technical program was presented by J. K. Wareham, engineer with Alco, New Kensington, Pa.

Mr. Wareham discussed tool design and metalworking of aluminum, covering alloys, mechanical properties, forming and deep drawing of aluminum. The Los Angeles representative for Alco, William Ballantine, was present for the meeting.



Technical speaker at the March 2 meeting of the Rochester chapter was Warren L. Hardy, left, grinding engineer, Norton Co. Shown with him is Donald F. Kohler who was installed that evening as chairman of the chapter. The meeting was held at Barnard's Exempt Club.

—Paul A. Burno

Carl Horvath Receives Fairfield County Award

Bridgeport, Conn.—Dr. Harry B. Osborn, Jr., second vice president of ASTE, conducted the installation of officers at the March meeting of the Fairfield County chapter and was the guest speaker during the technical session.

Guiding chapter activities during the next year are: R. W. Smith, chairman; Philip Marsilius, first vice chairman; Edgar R. Mayberry, second vice chairman; Eugene W. Laistner, treasurer; and Robert Mulhare, secretary. The service award of the chapter was presented to Carl K. Horvath for his outstanding work during the past year.

Dr. Osborn, technical director of the Tocco Div., Ohio Crankshaft Co., spoke on the various phases and applications of induction heating. His talk was supplemented with slides and a discussion period followed the lecture.

—Robert A. Brechter

Golden Gate Welcomes 300th ASTE Member

Oakland, Calif.—The three hundredth member of the Golden Gate ASTE chapter was welcomed at the March 18 meeting held at El Cortola Restaurant. He is Alfred Deakin of Ace Tool and Engineering Co. Mr. Deakin was a guest of the chapter for the evening and received his membership pin from Ted Rohrer, retiring chapter chairman.

The annual service pin was awarded to Henry De Coursey for his outstanding work as instructor of the tool engineering course sponsored by the Golden Gate chapter.

A past president of ASTE and well known in industrial circles, A. H. d'Arcambol officiated at the installation. He also presented the past chairman's pin to Mr. Rohrer and thanked him for all the work he has done during his term of office.

The technical speaker was Dr. W. R. Frazer, chief metallurgist, Union Twist Drill Co., and chairman of the Northern Massachusetts chapter of ASTE. His subject was "Recent Developments in Cutting Tools." Dr. Frazer covered recent metallurgical and design development in high-speed tools and carbide-type twist drills. The lecture was illustrated with slides.

—Ted Lindquist

ASTE Speaker Discusses Helicopter Manufacturing

Philadelphia—Featured speaker at the March meeting of the Philadelphia ASTE chapter was Anthony Vendetti, general supervisor of tool design and manufacturing, Piasecki Helicopter Corp. Mr. Vendetti delivered an informal talk on the tooling and manufacturing of helicopters.

A ten-minute introductory film was shown on the helicopter in manufacture and flight. Mr. Vendetti pointed out that the history of the craft dates back to sketches made by Leonardo da Vinci in the fourteenth century.

Although somewhat restricted by security regulations, he adeptly described the problems arising from rapid growth, continual design changes and subcontracting. By far the most perplexing problems result from design changes which "require extreme flexibility in tools and tool engineers and necessitate outguessing progress."

Models of helicopters were on display and photographs were circulated to add visual interest. A long and interesting period of discussion followed.

The meeting was conducted by Dick Gross, second vice chairman, in the absence of Campbell Pittsinger and Ed Hollingsworth who were attending the Leadership Conference. —J. Schroth

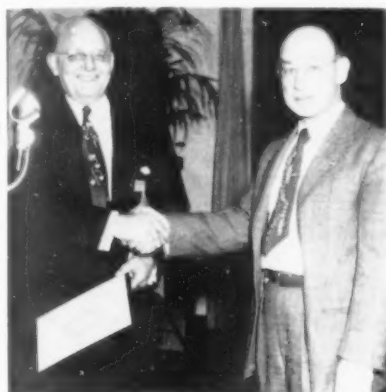


Taking the oath of office at the installation meeting of the Potomac ASTE chapter are: William F. Heffernan, first vice chairman; George M. Beck, chairman; William E. Jones, the outgoing chairman who is administering the oath; Wayne L. Boyer, second vice chairman; and Albert F. Schockey, secretary. The meeting was held in March at the Hamilton Hotel.

Donovan Installs Baltimore Officers

Baltimore—The installation of Baltimore ASTE officers, held at the March meeting, was conducted by Thomas J. Donovan, Jr., a national director of the Society. After administering the oath of office, Mr. Donovan was presented an honorary membership certificate which was signed by all chapter officers and committee chairmen.

Other awards were presented to Richard Coleman and Donald Wernz for their work in getting 16 new members each in the recent membership campaign. Ten other men were honored for bringing in three or more new members. The drive, which opened September 1, 1952, netted the chapter 75 new members, bringing the total to 257.



T. J. Donovan, left, receives honorary membership certificate.

Serving on the Advisory Council of the chapter in 1953-54 are Leon Laux, Thomas Burke and Andrew Jones. Committee chairmen are: Ernest Russell, Clifton G. Kelly, Walter George, Roy Pajarinen, William Schukraft, Harry B. Mecalun, James Rodgers, Neil Heller, George Andrews and Anthony Fria.

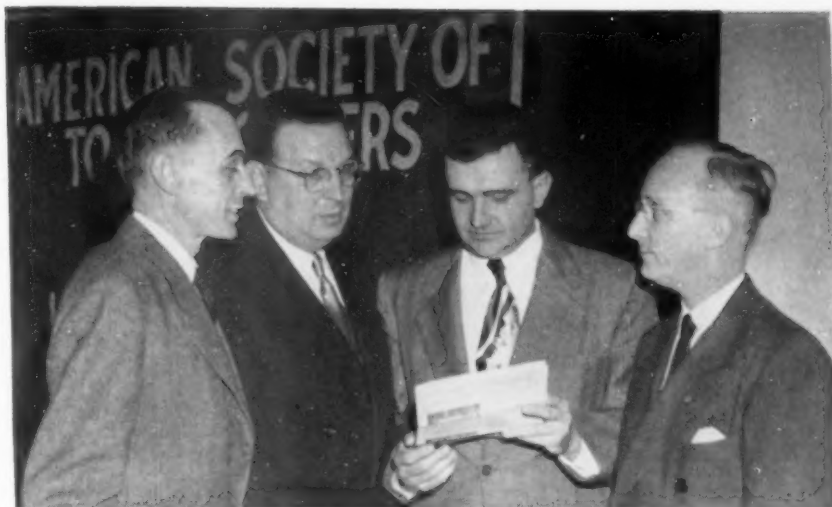
—LeRoy L. Rubright

Sponsors Classes in Technical English

Windsor, Ont.—The Windsor ASTE chapter is currently sponsoring classes in technical English for skilled workers among Canada's new citizens. The course is designed to help those newcomers to Canada, particularly those skilled in mechanical trades and professions, to better understand the English language and customs.

Windsor members, meeting at the Prince Edward Hotel on February 9, heard a talk by Wallace A. Stanley, assistant to the president of Progressive Welder Sales Co. Mr. Stanley spoke on the subject "Plastic Tooling."

—Ernest W. Harris



Seen examining the chapter bulletin published by Long Island ASTE members are: William Rogers, past chairman; Harry E. Conrad, executive secretary of the Society; Arthur Cervenka, chairman; and Arthur Diamond, chairman of the National Education Committee. Chapter officers include: George Gennett, first vice chairman; George McLaughlin, second vice chairman; John Hatter, secretary; and Max Stein, treasurer.

Obituary

Jacob A. Smith, president of the Durable Punch & Die Co. of Chicago, suffered a heart attack and died on March 24. Mr. Smith had been a senior member of the Chicago ASTE chapter since 1946. His company has been a staunch supporter of the Chicago chapter and its programs and the ASTE Industrial Expositions.

L. B. Bellamy Conducts Buffalo ASTE Installation

Buffalo — William J. Ickel was installed as chairman of the Buffalo-Niagara Frontier chapter of ASTE at the annual dinner meeting held March 6 at the Hotel Niagara. The ceremonies were conducted by L. B. Bellamy, national president of ASTE for 1952-53, who delivered an informal talk on the current activities of the Society.

Conrad, Diamond Attend Long Island Meeting

Garden City—Special guests at the March installation meeting of the Long Island chapter were Harry E. Conrad, ASTE executive secretary, and Arthur Diamond, chairman of the National Education Committee. Mr. Conrad talked on the Society's Leadership Conference and Mr. Diamond spoke on the work of his committee and the outstanding program of the Long Island education committee, headed by Harold Poett.

Long Island officers for the coming year were installed by Mr. Diamond. The past chairman's pin was presented to William Rogers, along with a handsome desk set suitably engraved as a gift from the chapter. The chapter's service pin went to Sheldon Meyers for his excellent work as business manager of the monthly bulletin and for his support of the membership committee the past two years.

Prof. Andrew E. Bryans of Adelphi College, Garden City, and three of his students were guests at the meeting.

—Mrs. Sara T. Moxley



Past President L. B. Bellamy enjoys the informal banter of William Clarke, past chairman.

Other members sworn into office were: Charles S. Oliver, first vice chairman; Harvey W. Ellis, second vice chairman; Russell W. Fitch, secretary; and Robert W. Slate, treasurer. Following the short business session, a program of dancing and other entertainment was provided by Mr. Fitch and his committee.

—Russell W. Fitch



New officers for 1953-54 were installed at the March meeting of the Williamsport chapter. From left: William Beach, treasurer; Donald Howery, secretary; Morris Smith, retiring chairman; William McCoy, chairman; George Lunt, second vice chairman; and Joseph Gehret, first vice chairman. The technical program was presented by John Baliant, Acro Mfg. Co.

Worcester Members Honor Past Chairmen

Worcester, Mass.—ASTE members of the Worcester chapter honored their past chairman March 3 with a special dinner meeting held at Putnam and Thurston's Restaurant. On hand for the event were: E. F. Taylor, charter chairman credited with starting the chapter in 1939; Henry Wilder, 1943; William McQuestion, 1945; Albert Warman, 1946; Charles Monigle, 1947; Ralph Rawling, 1948; Carl Schofield, 1949; Carroll Morse, 1950; and Ralph Baker, 1951.

The installation of officers was conducted by Victor H. Ericson, a past national officer of the Society. The retiring chairman, E. R. Ljungquist, reviewed chapter activities during his term of office. He highlighted the formation of the Northern Massachusetts chapter, establishment of a scholarship fund and of a course in jig and fixture design at Worcester Junior College.

Mr. Ljungquist turned his gavel over to chairman Rotchford who announced his appointments of committee chairmen; Louis J. Furman, program; Ralph A. Baker, constitution and bylaws; Franklin M. Angevine, educational; Harry D. Orr, advertising; Leonard Krasnow, standards; Paul I. Anderson, membership; Alvin H. Shairman, editorial; Donald E. Eaton, entertainment; Roger N. Perry, Jr., publicity; and Carroll L. Morse, professional engineering.

The technical speaker for the evening was Edwin M. Pearne, quality control engineer, DoAll Co., Des Plaines, Ill. Speaking on "A New Gaging System Using Gage Blocks for Direct Measurement," Mr. Pearne gave a description and actual demonstration of the "Micro-Step" measuring system introduced in 1952.—Harold F. Thompson

Leonard Kline Receives Williamsport Award

Williamsport — Leonard Kline was presented the service award of the Williamsport ASTE chapter at the installation meeting held March 9 at the Anglers' Club. More than 50 members and guests attended the session.

Technical speaker for the evening was John Balint, tool supervisor, Lycoming-Spencer Division of Arco Mfg. Corp., Williamsport. He reviewed the history of cutting tools and the development of metals used in their manufacture. A display of his company's products illustrated his talk.

—Leonard Kline



Club Chanticleer was the setting March 10 for the Ladies' Night and installation meeting of the Madison ASTE chapter. Pictured here, standing, from left: Robert O. Morehead, secretary; Fred H. Kessenich, past chairman and alternate delegate; John T. Murray, first vice chairman; and Alfred G. Hoffer, past chairman and installing officer. Seated: Lawrence R. Ellis, third vice chairman; Leon J. Bellefeuille, treasurer; and Edward J. Skidmore, second vice chairman. The newly installed chairman is Edward C. Helmke. Fred Lowe is the chapter delegate. The ceremonies followed a fillet mignon dinner. Music accompanied the dinner hour and flowers were presented to the ladies from the chapter.

Positions Available

CHEMIST—Experienced in development of soluble and nonsoluble cutting fluids. Sound chemical background required. Major oil company, Metropolitan New York. Box 432, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

MACHINE AND TOOL DESIGNER—With record of achievement in jig, fixture and special machine design wanted by nationally known midwestern firm. Permanent position with unusually good opportunity for qualified person to work into top spot. Pensions, insurance, etc. If you'd like Big-Time Career Challenge coupled with Good Leisure Life of a smallish city, send along business educational background and vital statistics first letter. Box 443, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

SUPERINTENDENT FOR PUNCH PRESS DIVISION—Liberal salary with attractive future. Many collateral benefits, including pension, insurance and vacation plans. Company is a leader in its field, with several plants located in Greater Cleveland area. A stable enterprise for more than 30 years. Qualified applicants will please state age, experience and qualifications deemed applicable. Address reply to Box 454, The Tool Engineer, 10700 Puritan Ave., Detroit 21, Mich.

Position Wanted

Do you need more Canadian business? Aggressive, well connected Canadian sales manager in the industrial field wishes to represent an American company in Canada. Address replies to: Box 499, The Tool Engineer 10700 Puritan Ave., Detroit 21, Mich.

Peoria ASTE Officers Installed by Crosby

Peoria—Installation officer at the March 3 meeting of the Peoria ASTE chapter was Joseph P. Crosby, first vice president of the Society. He spoke on national activities of ASTE, reviewed the past year in the local chapter, and told about the European tool shows which he attended last year.

New officers of the chapter are: Ray Zimmerman, chairman; Vic Schellsmidt, first vice chairman; Wilbur McWilliams, second vice chairman; Leo Johnson, secretary; William Bahnfleth, Jr., treasurer; and William Logue, delegate.

The service pin was presented to Richard Streitmiller for his outstanding work for the chapter during 1952. The past chairman's pin was given to William Logue and the chairman's pin was presented to Mr. Zimmerman.

Guest speaker was Kenneth N. Macomber, chief service engineer, Lapointe Machine Tool Co. He spoke on automotive broaching and showed two films to illustrate his discussion.

—Russ Saur

New Post for Marsh

Robert H. Marsh, treasurer of the Boston chapter of ASTE, has been promoted to the position of assistant chief engineer at the Lowell, Mass. plant of Raytheon Mfg. Co., missile and radar division. Formerly a product and production engineer at Raytheon, Mr. Marsh is now in charge of mechanical, tool and production engineering.



Kansas City ASTE officers for 1953-54, are, from left: Merlin Grundy, chairman; Harold Buddenbohm, first vice chairman; Gary Schroer, second vice chairman; Winton Jensen, secretary, and Maurice Manning, treasurer.

Connecticut Day Program Revealed

Final plans for Connecticut Day May 6 have been announced by Philip R. Marsilius, general chairman of the event. Sponsored annually by the Fairfield County, Hartford and New Haven chapters of ASTE, this year's program will be held in Bridgeport.

Guest speaker for the event will be Burnham Finney, editor of *American Machinist* magazine. Toastmaster will be A. V. Bodine, president of the Bodine Co. Activities will include plant tours of: Bullard Co., Raybestos Co., Manning Maxwell & Moore, Dictaphone Co., and Bridgeport-Lycoming Division of Avco Mfg. Corp.

—Robert A. Brechter

Kansas City Award Goes to H. R. Brown

Kansas City—About 350 members and guests attended the installation of officers and Ladies' Night held at the American Legion Hall by the Kansas City ASTE chapter. A. J. Mirick, a past chairman officiated. He presented the past chairman's pin to John Hoover. The award for outstanding service during 1952 to the chapter was given to Robert Brown, who served as chapter chairman in 1945-46.

Sheldon Cox Honored by Columbus Members

Columbus—March 11 found members of the Columbus ASTE chapter holding their annual Executives' Night at the Columbus Maennerchor. Installation of officers for 1953-54 was a feature event of the program. Howard F. Volz administered the oath of office.

The chapter's service award was presented to Sheldon Cox for his outstanding ASTE work during the past year. The gavel was turned over to Emmett A. Bartlow, newly elected chairman, by J. Mitchell.

The technical talk was given by Walter R. Buerckel, Nicholson File Co., Providence, R.I. His subject was "Manufacture, Metallurgy and Application of Files."

Among the guests at the meeting were: C. Stacey, J. Broden and J. Zerwick, Ternstedt Div., General Motors Corp.; F. Minshall, Armstrong Furnace Co.; E. Patton, Brown Steel Co.; R. Michalek and H. L. Johnson, Westinghouse Corp.; J. Keller and F. Westermeyer, North American Aviation; F. Norris and C. A. Hughes, Denison Engineering Co.; and W. A. Gardner, American Blower Corp.

—Roscoe Zwoll



The Columbus ASTE chapter presented a second half-hour television program early in March as one of a series in the Columbus technical Council and WBNS-TV public service programs. Participants, standing left to right, were: David Poli, a recipient of one of last year's ASTE International Education Awards and a student at Ohio State University; S. M. Matchett and Jack Mitchell, past presidents of the Columbus chapter; and Otto Schlaak of WBNS-TV. They are pictured looking at the Sheffield Precisionnairre. Assistance on the script and "props" was given by Arthur Gangloff of the V & O Press Co. and Jay N. Edmondson, of Ohio State University, the Sheffield Corp., and Doehler Die Casting Corp.

Director Installs Piedmont Officers

Winston-Salem, N. C.—Piedmont chapter officers were installed by National Director W. G. Ehrhardt at the March 9 meeting held at the Hotel Robert E. Lee. About 75 members and guests were present for the ceremonies and the technical program.

Serving the chapter during the coming year will be: E. N. Dietler, chairman; S. B. Jeffreys, first vice chairman; V. A. Hanson, second vice chairman; E. M. Ketchie, secretary; and A. R. Fairchild, treasurer.

A copy of the *Tool Engineers Handbook* was presented to Howard Blackwell for naming the chapter publication and the chairman's award was given to James Hairston. Coffee speaker was James Waller, chief of police, Winston-Salem, who talked on traffic safety.

"Consideration in Selecting Proper Milling Equipment" was discussed by A. A. Heckmann, supervisor of the engineering service department, Cincinnati Milling Machine Co. He emphasized high production special machines and economic factors affecting selection. Slides and movies illustrated the program.

The chapter's February meeting was highlighted by the election of officers and a discussion by Edward L. Hurst, district field engineer, Norton Co., Worcester, Mass., on grinding problems and their solutions. After tracing the history of abrasive wheel manufacture, Mr. Hurst summarized the factors affecting proper wheel selection and emphasized the proper manner to solve a grinding problem. —Henry H. Palmer



Joseph P. Crosby, far right, administers the oath of office to the Boston members who will be leading chapter activities during 1953-54. From left: Thomas B. Walsh, secretary; Karl G. Nowak, first vice chairman; Wilfred B. Wells, chairman; and Walter B. Pohle, second vice chairman. Robert H. Marsh, treasurer, was not present when the photograph was taken. More than 300 members and guests attended the installation which highlighted the Ladies' Night program held at New England Mutual Hall. Events included a science demonstration staged by General Electric Co.

Granite State Chapter Holds Executives' Night

Portsmouth, N.H.—Officers of the Granite State chapter were installed at the annual executives' night meeting held in March at the Rockingham Hotel. ASTE members paid tribute to the industrial executives present that night for their cooperation and assistance in furthering the growth of the Society.

Robert Gay of the National Membership Committee conducted the installation ceremonies. The program speaker was John Pillsbury, majority floor leader for the New Hampshire House of Representatives, who addressed the group on "Human Relations in Industry." —Carmel P. Radwan

Ed Reed Receives Saginaw Valley Honor

The first chairman of the Saginaw Valley ASTE chapter, Michael Skunda, conducted the installation of the 1953-54 officers at the March meeting held at the General Motors Institute in Flint.

Nearly 225 members and guests saw the following men take office: Donald A. McMillan, chairman; Albert Blackmon, first vice chairman; Stephen A. Mathews, second vice chairman; Charles F. Bierwirth, secretary; and Harold W. Snider, treasurer. The award for the most outstanding service and contribution to the chapter was presented to Ed Reed.

Guests at the session included Prof. W. W. Gilbert of the University of Michigan and Prof. Frederick Preator of Utah State College, both members of ASTE's National Education Committee; and Guy Cowing, president of General Motors Institute. Mr. Cowing spoke on the subject "Evolution of Tool and Die Engineering." Other talks were delivered by Prof. Preator and Howard Roat, chairman of the chapter's professional engineering committee.

—Ben Phillips



Pictured at the Executives' Night and installation meeting of the Granite State ASTE chapter, seated from left, are: Robert Gay, National Membership Committee and installing officer; Capt. John R. Moore, USN, production officer, Portsmouth Naval Shipyard; Jacob J. Repetto, chapter chairman; and John Pillsbury, majority floor leader of the New Hampshire House of Representatives. Standing: George L. Chapman, Jr., secretary; Gino F. Magnani, treasurer; Harold M. Smith, first vice chairman; and Joseph L. Rousseau, second vice chairman.

M. E. Hackstedde Joins Cleveland Firm

Geco, Inc., one of the affiliates of the General Engineering Co., has announced the appointment of M. E. Hackstedde as manager of its Product Heat Division where he will be in charge of sales and manufacturing. Formerly sales engineer for the Tocco Division of Ohio Crankshaft Co., Mr. Hackstedde will be located at Geco's Cleveland headquarters. He is a member of ASTE, the American Society for Metals and the Engineering Society of Buffalo.

Executives' Night Draws 350 Members and Guests

St. Louis—The fifteenth annual Executives' Night of the St. Louis ASTE chapter, held March 5 at the DeSoto Hotel, was attended by nearly 350 members and guests. The meeting featured talks by L. B. Bellamy, 1952-53 president of ASTE, and J. J. Demuth, 1951-52 president. Another highlight was the presentation of the award of the National Public Relations Association to ASTE for its outstanding public relations. Mr. Demuth accepted the honor for the Society.

Officers of the St. Louis chapter were installed by Mr. Bellamy. Retiring chairman E. P. Huchzermeier presented his chairman's pin and gavel to Willis G. Potthoff, who was named chairman for 1953-54.

A reception for executives from the St. Louis area and other special guests launched the evening's activities. During the dinner hour, a quartet of vocalists from the St. Louis Metropolitan Police entertained with songs of good close harmony.

The program featured a speech made by Harrison Wood, journalist, correspondent and world traveler, on "This Changing World." Mr. Wood gave a searching insight into the life and rise of Joseph Stalin, a particularly timely topic because of the dictator's death just two hours earlier.

In his discussion, Mr. Bellamy emphasized today's serious shortage of engineers and urged the chapter to do everything possible to promote engineering. Mr. Demuth stressed the extreme urgency in designing and producing machine tools quickly.

—E. Grasser



National headquarters of ASTE and the Canadian chapters of the Society are again participating in the Canadian International Trade Fair which opens in Toronto on June 1. The ASTE exhibit, located in the machinery division, will serve as headquarters for Society members attending the two-week event.

Andrews Conducts Binghamton Installation

Binghamton, N.Y.—More than 70 members and guests attended the March meeting of the Binghamton chapter held at the Vestal American Legion. The officers for 1953-54 were installed by Roland B. Andrews, past chairman. The new chapter chairman is William A. Leindecker.

Fred M. Mylchreist, field engineer, Whitman-Barnes Tool Co., spoke on the topic "Shop Talk on Drills and Reamers."

—Charles L. King

Bergstrom Addresses ASTE-ASM Meeting

Cincinnati—A talk by Swan E. Bergstrom, vice president and a director of Cincinnati Milling Machine Co., was featured at a meeting of the Cincinnati chapters of ASTE and ASM, held March 5 at the Engineering Society of Cincinnati. Mr. Bergstrom, who is president of the National Machine Tool Builders' Association, spoke on the history and future of the machine tool industry.

Officers of the ASTE chapter were installed at the meeting by George H. Simon, a past chairman. Richard B. Niebusch was sworn in as chairman, Joseph C. Maezer, first vice chairman; Robert M. Shumway, second vice chairman; Frank Heap, secretary; and John H. Elfring, treasurer. The service award for the past year was presented to Robert M. Shumway by Joseph Aprile, retiring chairman.

The meeting, attended by 120 members, followed dinner served at the ESC headquarters. Coffee speaker was Fred W. Giesel, business manager of the *Cincinnati Post*. He talked on "Signs along Life's Highway."

—Louis H. Schumann

Named Methods Engineer

Peter Adlen, recipient of the 1952 service award of the Wichita ASTE chapter, has been appointed methods engineer and tooling manager for Parker-Wolverine of Detroit. Mr. Adlen will be in charge of processing, methods, tool procurement and the maintenance of tools. He was formerly associated with Boeing Aircraft Co. and LaSalle Engineering Co. in Wichita.



Richard B. Niebusch, right, was sworn into office on March 5 as the new chairman of the Cincinnati ASTE chapter. He succeeds Joseph Aprile, center, in the executive position. Shown with them is L. D. Richardson of Eutectic Welding Alloy Corp. Featured speaker at the installation meeting was Swan E. Bergstrom, vice president, Cincinnati Milling Machine Co.



St. Louis chapter's new chairman, W. J. Potthoff, left, receives the gavel from the retiring chairman, E. P. Huchzermeier, at the group's installation meeting held on March 5 at the DeSoto Hotel. The installation ceremonies were conducted by Leslie B. Bellamy, Society president during 1952-53. The meeting also served as the fifteenth annual Executives' Night.

Thornberry Installed as Nashville ASTE Chairman

Nashville—ASTE officers of the Nashville chapter were installed by Fred Wright at the March meeting. They are: W. A. Thornberry, chairman; August Dobert, first vice chairman; Lee Severy, second vice chairman; J. E. Riordan, secretary; Merrill Preston, treasurer.

Program speakers were Robert Winblad, Cincinnati Milling Machine Co., and Fred Jessup, Grinders, Inc., Cincinnati. Mr. Winblad spoke on the process of metal removal by the milling operation and Mr. Jessup discussed chip removal by grinding, wheel dressing and the proper use of the diamond.

A film produced for Cincinnati Milling Machine Co. pictured the manufacture of Cimcool and the effects of different coolants upon the various types of metal removal. A discussion period followed the showing.

At the chapter's February meeting, Past Chairman Scobey Rogers was awarded the Nashville ASTE service pin for his outstanding work during the past year. The technical program was presented by John Harrington, chief engineer, The DoAll Co., Des Plaines, Ill. He talked on dimensional quality control and demonstrated the DoAll gage block system.

—J. E. Riordan and Joseph Sharpe

Named District Manager

Francis T. Thorley, member of the Little Rhody ASTE chapter, has been appointed eastern district manager of the Hy-Pro Tool Co. of New Bedford, Mass. He joined the firm in 1941 in the technical department and has served on the sales staff in Massachusetts, Rhode Island, New York and Connecticut.



Paul V. Rohling, left, retiring chairman of the Fond du Lac ASTE chapter, presents the gavel to E. J. Kaiser, 1953-54 chairman.

E. J. Kaiser Heads Fond du Lac Chapter

Fond du Lac, Wis.—More than 100 members and guests of the Fond du Lac ASTE chapter were present for the installation meeting held March 13 at Bernward Hall. E. J. Kaiser was sworn into office as chairman. Other men who took office are: H. S. Faith, first vice chairman; Herbert Zentner, second vice chairman; N. P. Schnettler, secretary; and Lynton Kirby, treasurer.

Charles Billberg, a charter member of the chapter, gave the past chairman's pin to Paul V. Rohling, retiring chairman. N. R. Boynton received the service award pin for his outstanding contributions to the chapter. He has held nearly every major office of the chapter and has headed many important committees.

After the formal meeting, the chapter heard a talk by John Gassoway of the FBI's Milwaukee office. He spoke on the work and training of FBI agents.

—R. M. Hanson



Erie Chairman Harry Rudd, fourth from left, receives the congratulations of Dr. Harry E. Osborn, Jr., second vice president of ASTE, at the March 3 meeting held at the General Electric Community Center. Other officers shown, from left, are: Walter Cebeliski, past chairman; William Kaelher, treasurer; Clyde Pelton, secretary; Leo Weiner, first vice chairman; and William Snook, second vice chairman. About 60 members and their guests were present for the dinner and installation. After the ceremonies, a movie on electronics, produced for Westinghouse Electric Corp., was shown during the technical session.

Shaner Named Chairman, Fox River Valley Chapter

St. Charles, Ill.—More than 80 members of the Fox River Valley chapter attended the election meeting held at the Rainbow Room of the Hotel Baker. Men named to chapter posts were: P. C. Shaner, chairman; D. E. Zierk, first vice chairman; W. C. Perkins, second vice chairman; C. A. Olson, secretary; R. J. Evans, treasurer; G. R. Parsons, delegate; and Mr. Shaner, alternate delegate.

Program speaker for the evening was William Splinter, machinability engineer, Republic Steel Corp., Chicago. He emphasized the importance of providing tools and operating conditions for maximum life of tools. Coolants, types of tools, rigidity of toolholders, clearances of tools, cutting speeds and other requirements were explained in detail.

—Donald E. Zierk

Lehigh Valley Award Presented to Campbell

Allentown, Pa.—Outgoing Chairman John Eaton officiated at the installation of officers of the Lehigh Valley ASTE chapter held at the Hotel Traylor. They are: John D. Folwell, chairman; Werner O. Miller, first vice chairman; William Scheibel, second vice chairman; Ralph L. Mueller, treasurer; and Vincent Scalese, secretary. The chapter's annual award for the most outstanding service was given to the secretary for 1952-53, Hobart T. Campbell.

The technical program on "Precision Gaging" was presented by John A. Harrington, chief engineer, DoAll Co., and vice president in charge of research, Continental Machine Co. He stressed the importance of exact calibration of primary measuring instruments and periodic checking of inspection gages.

—George W. Savitz

Col. Kinard Addresses New York Members

New York—Psychological warfare, its uses and history, was described by the coffee speaker at the March dinner meeting of the Greater New York chapter held at the New York Times Building. The discussion was presented by Col. William H. Kinard, Jr., and included the uses of the different types of propaganda in psychological warfare.

The technical talk was given by Clinton V. Johnson, owner of Johnson Gage Co., Bloomfield, Conn., on the subject "Screw Threads and Their Gaging." He covered the capabilities of many thread gaging devices and showed slides on the development of screw threads and gaging methods.

—Robert Frechman

COMING MEETINGS

- CLEVELAND**—May 8. "For This We Fight" by F. Russell Widmer of Republic Steel Co., Cleveland.
- COLUMBUS**—May 13, 6:30 p.m., Columbus Maennerchor. "Parts and Mold Design" by Carl A. Sundstorm, commercial engineer, General Electric Plastics Div., Pittsfield, Mass.
- DETROIT**—May 14, 6:30 p.m., General Motors Technical Center. Plant tour to be conducted by L. A. Walsh, manager of engineering staff activities at G.M. Dinner will be served.
- GRAND RIVER VALLEY**—May 8, Ladies' Night.
- INDIANAPOLIS**—May 7. A representative of the Cummins Engine Co., Columbus, Ind., will discuss tooling problems. A sound and color film on the diesel racing car will also be presented.
- LONG ISLAND**—May 11, 8:30 p.m., Garden City Hotel. "Important Factors in Grinding Steels" by Dr. Leo Tarasof, Norton Co., Worcester, Mass.
- LOUISVILLE**—May 12, "Meehanite Dies" by Paul Stuff, Ross-Meehan Foundries, Chattanooga, Tenn.
- MILWAUKEE**—May 14. "Powdered Metals and Titanium" by Malcolm F. Judkins, chief engineer, Firth Sterling Steel & Carbide Corp., Pittsburgh, Pa.
- MONTREAL**—May 14, 7:45 p.m., Montreal Technical School. Program will be presented by H. T. Miller, chief engineer, The Churchill Machine Tool Co., Manchester, England.
- NASHVILLE**—May 19, 6:30 p.m., Shelby Park, Annual steak fry.
- PETERBOROUGH**—May 7. Plant tour.
- PHILADELPHIA**—May 21. "Drawing Compounds and Their Use" by James Carse, Johnson Wax Co.
- PITTSBURGH**—May 1. Plant tour.
- PORTLAND (Me.)**—May 8, 7 p.m., Columbia Hotel. Ladies' Night. Program to be presented by John G. Hardy, manager, New England Telephone and Telegraph Co.
- ROCKFORD AREA**—May 14. "Tooling of Multiple Slide Presses" by A. Melnick, U. S. Tool Co., Ampere, N.J.
- SAGINAW VALLEY**—May 21, 7 p.m., plant tour of A C Spark Plug Co.
- SPRINGFIELD, (Ill.)**—May 5. Field trip to St. Louis, Mo. for a tour of the Chevrolet assembly plant.
- TORONTO**—May 6, 8 p.m., Plant tour of Frigidaire Products of Canada, Ltd., Scarborough, Ont.
- TWIN CITIES**—May 6. Annual smoker.
- TWIN STATES**—May 13, Trade Winds Cafe, Springfield. "Jet Engine Tooling" and "Machinability of Heat Resistant Materials" by Charles Sadon and Warren Frazer, General Electric Co.



New officers of the Springfield, Ill., chapter of ASTE were elected and installed at the March 3 meeting held at the Mill. Left to right, they are: O. N. Littell, first vice chairman; L. L. Rasch, second vice chairman; Earl J. Kane, chairman; Robert C. Peek, past chairman; Robert C. Waters, secretary; Willis G. Ehrhardt, a national director of the Society; and Lou Slager, treasurer, member of the National Membership Committee. R. N. Richig, treasurer, was not present for the photograph. The technical program was presented by E. C. Polidor, director of research and engineering at Optical Gaging Products, Inc., Rochester, N. Y. He spoke on "Optical Gaging by Projection," explaining the techniques used in this field.

—Charles E. Collier



Jerry Durrie, left, presents the Albuquerque chapter gavel to H. P. Baeker, newly-elected chairman for 1953-54. Other officers are: Douglas B. Kennedy, first vice chairman; Julian C. Moody, secretary; William Porter, treasurer; and Fred Deiber, second vice chairman. All are charter members of the chapter. Serving on committees for the coming year are the following chairmen: R. F. Masak, constitution and by-laws; H. E. Anderson, editorial; G. W. Smith, membership; O. O. Nerhus, standards; H. R. Hanen, program; S. L. Maisel, public relations; J. F. Hammerstran, education; and A. W. Miller, professional engineering.

—H. E. Anderson



Peterborough ASTE officers, pictured here, were installed on March 5 by Gerald A. Rogers, a national director of the Society and a past chairman of the Montreal chapter. From left, they are: Borden Sherry, treasurer; Ralph Sanderson, secretary; Earl Wellman, third vice chairman; Len Hansler, chairman; Bruce MacKenzie, second vice chairman; and Bert Jeffries, first vice chairman. The ward for outstanding service during the past year was given to Hugh Heslip, chairman of the program committee for 1952-53. The technical speaker was C. P. Farr, chief engineer for Modern Tool Works, Ltd., and a vice chairman of the Toronto chapter.

Directory of ASTE Chapter Chairmen

- AKRON** No. 47, Third Tuesday, Frank A. Flannery, 211 Edgerton Rd., Akron, Ohio
- ALBUQUERQUE** No. 93, First Friday, Harold P. Baecker, 1721 Ridgcrest Dr., Albuquerque, N. M.
- ATLANTA** No. 61, Third Monday, Charles D. Toney, Jr., 774 Dill Ave., S.W., Atlanta, Ga.
- BALTIMORE** No. 13, First Wednesday, Donald E. Wernz, 1214 Regester Ave., Baltimore 12, Md.
- BINGHAMTON** No. 25, First Wednesday, Howard D. Bertholf, 46 Matthews St., Binghamton, N. Y.
- BOSTON** No. 33, Second Thursday, Wilfred B. Wells, 94 Walnut Hill Rd., Chestnut Hill 67, Mass.
- BUFFALO-NIAGARA** No. 10, Second Thursday, William J. Iekel, R.F.D. 1, Springville, N. Y.
- CEDAR RAPIDS** No. 71, Third Wednesday, Richard L. Coyner, 119 Rapids Ave., S.W., Cedar Rapids, Iowa
- CENTRAL PENNSYLVANIA** No. 22, First Monday, Raymond H. Meckley, R.F.D. 1, Red Lion, Pa.
- CHICAGO** No. 5, Second Tuesday, Harry A. Paine, Federal Machine Sales, 4639 Washington Blvd., Chicago 44, Ill.
- CINCINNATI** No. 21, Second Tuesday, Richard B. Niebusch, 3921 Woodford Rd., Cincinnati 13, O.
- CLEVELAND** No. 3, Second Friday, Gordon W. Carlton, 1910 Seneca Dr., Euclid 17, Ohio
- COLUMBUS** No. 36, Second Wednesday, Emmett A. Bartlow, 2080 Riverside Dr., Columbus 12, O.
- DAYTON** No. 18, Second Monday, Richard A. Miller, Economy Tool & Die, P.O. Box 127, Dayton 10, Ohio
- DECATUR** No. 58, Next to last Thursday, Robert Serr, Forrest Knolls Est., Decatur, Ill.
- DENVER** No. 77, First Wednesday, C. J. Helton, 61 S. Cherokee, Denver 9, Colo.
- DES MOINES** No. 80, Third Wednesday, Geo. F. McMaster, 304 Hillside W., Des Moines, Iowa
- DETROIT** No. 1, Second Thursday, Michael Pinto, Douglas Tool Co., 3437 Goldner Ave., Detroit 10, Mich.
- ELMIRA** No. 21, First Monday, Edwin Chas. Bates, 111 Oakwood Ave., Elmira Hts., N. Y.
- ERIE** No. 62, First Tuesday, Harry M. Rudd, 2717 Cascade St., Erie, Pa.
- EVANSVILLE** No. 73, Second Monday, Paul W. Vierling, Benerson Corp., 418-424 N. Willow Rd., Evansville 11, Ind.
- FAIRFIELD COUNTY** No. 6, First Wednesday, Richard W. Smith, 141 Edgehill Rd., Fairfield, Conn.
- FOND DU LAC** No. 45, Second Friday, Erwin J. Kaiser, 530 E. Division St., Fond du Lac, Wis.
- FORT WAYNE** No. 56, Second Wednesday, Donald D. Welbaum, 2318 Wayne-Wood Dr., Ft. Wayne 6, Ind.
- FOX RIVER VALLEY** No. 72, First Tuesday, Philip C. Shaner, 203 N. Washington, Batavia, Ill.
- GOLDEN GATE** No. 28, Third Wednesday, David A. Gustafson, 2765 Argyle St., Oakland 2, Calif.
- GRAND RIVER VALLEY** No. 81, First Friday, John Ward, Can. General Tower, 52 Middleton St., Galt, Ont., Can.
- GRANITE STATE** No. 86, Second Tuesday, Jacob J. Repetto, Clarostat Mfg. Co., Washington St., Dover, N. H.
- GREATER LANCASTER** No. 89, Second Tuesday, Raymond C. Moorhead, 1912 Sterling Pl., Lancaster, Pa.
- GREATER NEW YORK** No. 34, First Monday, Hartley W. Barclay, King St., Port Chester, N. Y.
- HAMILTON** No. 42, Second Friday, Clarence E. Bulmer, 43 Whitton Rd., Hamilton, Ont., Can.
- HARTFORD** No. 7, First Monday, Omer A. Gingras, Pratt & Whitney Div., West Hartford, Conn.
- HOUSTON** No. 29, Second Tuesday, Harmon O. Traugber, 302 Norwood, Houston 11, Tex.
- INDIANAPOLIS** No. 37, First Thursday, Joe Penn, 526 Mills Ave., Indianapolis 27, Ind.
- JACKSON** No. 87, Third Monday, Theodore Vickers, 726 Griswold St., Jackson, Mich.
- KANSAS CITY** No. 57, First Wednesday, Merlin R. Grundy, 2600 Somers Dr., Kansas City 5, Mo.
- KEYSTONE** No. 101, First Thursday, Jack Lipman, 439 Irving Ave. N., Scranton, Pa.
- LaCROSSE** No. 96, Fourth Tuesday, Edward J. Giroux, 1035 S. 19th St., LaCrosse, Wis.
- LEHIGH VALLEY** No. 83, Third Friday, John D. Folwell, 614 N. St. Elmo, Allentown, Pa.
- LIMA** No. 97, Third Thursday, A. E. Feightner, R.F.D. 1, Elida, O.
- LITTLE RHODY** No. 53, First Thursday, Fred W. Kunath, 29 Taylor St., Cranston, R. I.
- LONDON-ST. THOMAS DISTRICT** No. 91, Third Thursday, Louis Jensen, Kelco Eng., Ltd., 352 Thames St., London, Ont., Can.
- LONG BEACH** No. 84, Second Wednesday, Carlyle E. Blanchard, 5760 Appian Way, Long Beach 3, Calif.
- LONG ISLAND** No. 88, Second Monday, Arthur Cervenka, Vanderbilt Blvd., Oakdale, L. I., N. Y.
- LOS ALAMOS** No. 92, 1st Thursday after 1st Wednesday, Frank J. Elliott, 2084 46th St., Los Alamos, N. M.
- LOS ANGELES** No. 27, Second Thursday, Carl L. Almquist, Almquist Bros., 2300 E. 49th St., Los Angeles 54, Calif.
- LOUIS JOLIET** No. 104, Third Tuesday, Harry J. Moffat, Caterpillar Tractor Co., Joliet, Ill.
- LOUISVILLE** No. 54, Second Tuesday, Robert F. Lenz, 3127 Eagle Path, Louisville 13, Ky.
- MADISON** No. 75, Second Tuesday, Edward C. Helmke, Gisholt Mach. Co., 1200 E. Washington, Madison 3, Wis.
- MEMPHIS** No. 105, Second Friday, Albert T. Hicks, Hays Machine Tool Co., 269 So. Front, Memphis, Tenn.
- MID-HUDSON** No. 74, Second Tuesday, Stanley P. Cook, Vassar View Rd., Poughkeepsie, N. Y.
- MILWAUKEE** No. 4, Second Thursday, Eugene J. Anspach, Line Material Co., 700 W. Michigan St., Milwaukee 1, Wis.
- MOHAWK VALLEY** No. 78, Fourth Tuesday, Earl K. Wheat, 301 Otsego St., Ilion, N. Y.
- MONTREAL** No. 50, Second Thursday, Charles A. Gareau, 1080 Crevier Ville, St. Laurent, Que., Can.
- MUNCIE** No. 70, First Tuesday, Norman E. Hines, 2106 1/2 So. Washington St., Marion, Ind.
- NASHVILLE** No. 43, Third Tuesday, Warren A. Thornberry, General Machine Co., 715 12th Ave. So., Nashville, Tenn.
- NEBRASKA** No. 103, Joe A. Duncanson, P.O. Box 148, Seward, Neb.
- NEW HAVEN** No. 41, Second Thursday, Emanuel Edw. Lull, Crucible Steel Co., 131 Park St., New Haven, Conn.
- NEW ORLEANS** No. 60, First Tuesday, Lawrence C. McKinley, 606 Julius Ave., New Orleans, La.
- NIAGARA DISTRICT** No. 65, First Thursday, Albert A. Clarkson, 154 S. Dr., St. Catharines, Ont., Can.
- NORTHERN MASSACHUSETTS** No. 100, Third Tuesday, Glen H. Stimson, Greenfield Tap & Die Co., Sanderson St., Greenfield, Mass.
- NORTH TEXAS** No. 51, Second Friday, Jimmie E. Franklin, 705 N.W. 9th St., Grand Prairie, Tex.
- NORTHERN NEW JERSEY** No. 14, Second Tuesday, William E. Wheaton, 915 W. 6th St., Plainfield, N. J.
- PATERSON** No. 102, Charles M. Bazas, 272 Maryland Ave., Paterson, N. J.
- PEORIA** No. 31, First Tuesday, Raymond J. Zimmerman, Roanoke, Ill.
- PETERBOROUGH** No. 94, First Thursday, Leendert Hansler, 624 Donegal St., Peterborough, Ont., Can.
- PHILADELPHIA** No. 15, Third Thursday, C. R. Pittsinger, 210 Montgomery Ave., Oreland, Pa.
- PIEDMONT** No. 82, Second Monday, Edward Neal Dietler, Crucible Steel Co., P.O. Box 2402, Charlotte, N. C.
- PITTSBURGH** No. 8, First Friday, Lawrence J. Brozek, 2508 Collins Rd., Pittsburgh, Pa.
- PONTIAC** No. 69, Third Monday, Hilton V. Phipps, Cutting Tl. Supplies, 88 S. Cass Ave., Pontiac, Mich.
- PORTLAND, ME.** No. 46, Second Friday, Faye B. Taylor, 18 Birch Ln., R.F.D. 4, Portland, Me.
- PORTLAND, ORE.** No. 63, Third Thursday, Melvin S. Nielsen, 9043 N. W. Leahy Rd., Portland 1, Ore.
- POTOMAC** No. 48, First Thursday, George M. Beck, 7917 Kentbury Dr., Bethesda, Md.
- RACINE** No. 2, First Monday, Wallace E. Swan, Racine Tool & Machine Co., 1760 State St., Racine, Wis.
- RICHMOND** No. 66, Second Tuesday, R. H. Culbertson, 11 S. W. 5th, Richmond, Ind.
- ROCHESTER** No. 16, First Monday, Donald F. Kohler, 240 Vanvorhis Ave., Rochester 17, N. Y.
- ROCKFORD** No. 12, Second Thursday, William Moreland, 3304 Minnesota Ave., Rockford, Ill.
- SAGINAW VALLEY** No. 68, Third Thursday, Donald A. McMillan, 3316 Court St., Saginaw, Mich.
- ST. LOUIS** No. 17, First Thursday, Willis J. Potthoff, Route 2, Box 64, Graeser Road, Creve Coeur, Mo.
- SALT LAKE CITY** No. 85, First Friday after 1st Wednesday, Frederick Preator, 530 N. Third, East Logan, Utah
- SAN DIEGO** No. 44, Second Tuesday, Arthur E. Crom, 1759 Oliver Ave., San Diego 9, Calif.
- SAN FERNANDO** No. 99, First Wednesday, Rudolph Regen, 4533 Fulton Ave., Sherman Oaks, Calif.
- SAN GABRIEL VALLEY** No. 93, First Thursday, Peter Carter, Rain Bird Sprinkler Mfg. Corp., 19233 E. Foothill, Glendora, Calif.
- SANTA CLARA** No. 98, Third Tuesday, William C. Lanyon, 104 Oak Hill Way, Los Gatos, Calif.
- SCHENECTADY** No. 20, Second Thursday, George S. Nelson, 315 Florida Ave., Amsterdam, N. Y.
- SEATTLE** No. 39, Fourth Tuesday, Roy A. Coady, 6559 43rd Ave., N.E., Seattle 5, Wash.
- SOUTH BEND** No. 30, Second Tuesday, James L. Kemp, 909 Sherman, South Bend, Ind.
- SPRINGFIELD, ILL.** No. 64, First Tuesday, Earl J. Kane, 200 S. MacArthur Blvd., Springfield, Ill.
- SPRINGFIELD, MASS.** No. 32, Second Monday, Robert M. Dickson, 29 Maybrook Rd., Springfield 9, Mass.
- SPRINGFIELD, OHIO** No. 76, Second Tuesday, Richard C. Montanus, Signal Hill Rd., Springfield, Ohio
- SYRACUSE** No. 19, Second Tuesday, Robert D. Fulford, 309 Melrose Ave., Syracuse 6, N. Y.
- TOLEDO** No. 9, Second and fourth Wednesday, Joseph J. Kertz, 4554 Willys Parkway, Toledo 12, Ohio
- TORONTO** No. 26, First Wednesday, Dave R. J. Few, 85 Northline Rd., Toronto, Ont., Can.
- TRI-CITIES** No. 23, Second Wednesday, Gilbert H. Jording, 2015 42nd St., Rock Island, Ill.
- TUCSON** No. 106, Second Tuesday, James D. Beach, 5828 Nogales Hwy., Tucson 2, Ariz.
- TULSA** No. 90, Second Thursday, Lester W. Williams, 717 So. Marion, Tulsa, Okla.
- TWIN CITIES** No. 11, First Wednesday, Carl E. Fasth, 2700 29th Ave., N. E., Minneapolis 13, Minn.
- TWIN STATES** No. 40, Second Wednesday, George Julien, 26 Smith St., Springfield, Vt.
- WATERLOO AREA** No. 79, Fourth Wednesday, Gerald E. Osworth, Tecumseh Products, Tecumseh, Mich.
- WESTERN MICHIGAN** No. 38, Second Monday, Harry J. Swanson, Swanson Machine, 1422 Lake Dr., S. E., Grand Rapids 6, Mich.
- WICHITA** No. 52, Second Wednesday, Ambrose A. Reddy, 430 S. Vine, Wichita, Kan.
- WILLIAMSPORT** No. 49, Second Monday, William J. McCoy, 316 E. Central Ave., S. Williamsport, Pa.
- WINDSOR** No. 55, Second Monday, John F. Johnston, 30 Thomson Blvd., Riverside, Ont., Can.
- WORCESTER** No. 25, First Tuesday, John Edw. Rotchford, Lodding, Inc., 73 Beacon, Worcester 2, Mass.

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May, 1953

News in Metalworking . . .

CARBIDE SHELL CORE PRODUCTION MECHANIZED

Production of solid tungsten carbide antitank shell cores at the Carboly Department of General Electric Co. at Detroit involves a wide range of manufacturing processes including powder metallurgy techniques, molding or compacting, materials handling, heat treating, machining, inspection, and testing. Except for inspection and testing procedures, core manufacturing is on a semimechanized basis from the point where the prepared metal powders enter the line to final inspection.

The solid tungsten carbide core, now produced for both 76 and 90 mm carriers, was originally developed in two days to meet a combat emergency during World War II. Within two weeks, it was test-fired and shipped in quantities to the European invasion front.

Production of the antitank cores begins with mixing of the metal powders for the molding operation. The formula is the same as for tungsten carbide cutting tools except that a pressing lubricant (paraffin) is added to serve as a preliminary binder.

At the core line, the metal powders in steel barrels are positioned near the two molding presses by floor roller conveyors. Roller bearing switches in the conveyor line make it easy to feed the barrels to either of the presses with little effort. A special lifting device near each of the presses enables a barrel of powder to be lifted and tilted to the proper position required by the press operator. Since the cores are produced to exact government specifications, the press operator weighs out the exact amount of metal powder for each compact. After weighing the powder, he pours it into the mold and actuates the

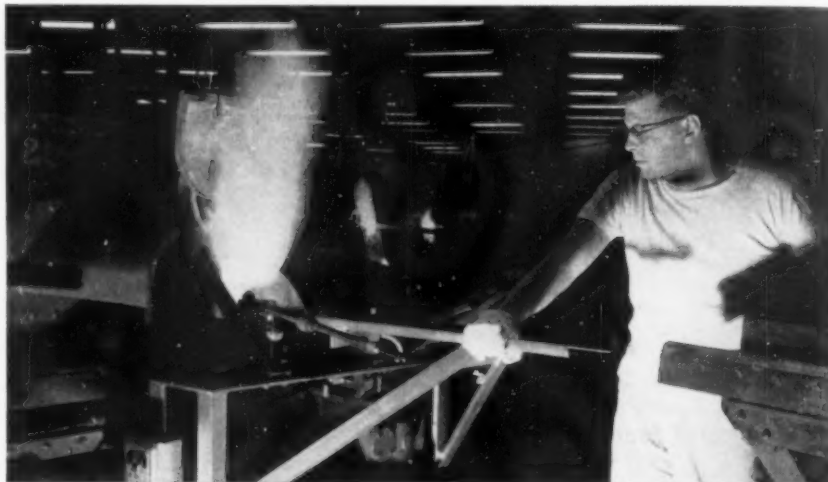
press. The powder is compressed under 60-ton pressure for 13 seconds.

After compacting, the cores are placed on rubber padded trays resting on a gravity conveyor line near the press. At this stage, the cores are soft and easily damaged. Once on the conveyor line, the cores travel to the presintering furnaces. There, they are taken from the trays and packed in graphite containers about 30 inches long. Ten cores are placed in each of the "boats" which are packed with powdered asbestos. Excess powdered asbestos dropped is caught in a collector system that salvages it for re-use. The packed and covered graphite boats enter the presintering furnace in a train.



A diamond grinding wheel is used on a core nose to adjust the ogive before final inspection. At this stage, cores have an average Rockwell hardness of 83 A.

At the sintering furnaces, cores are unloaded from trays, placed in graphite boats, and covered with Alundum powder. Hydrogen gas is used in heat treating the cores traveling through the automatically controlled furnaces.



First step in transforming powder metal into anti-tank cores of solid tungsten carbide is molding. Operator lifts a compacted core from the mold.



Automatic controls keep them traveling through the furnace at an even pace. It takes 10 hours to make the entire trip through the two stages of the presintering operation. Furnace loading is timed so that a boat is charged every 77 minutes and one taken out from the other end at the same time. Hydrogen gas is used for the heat treating.

The first presintering stage serves to burn out the paraffin from the cores; the second hardens them just enough to be handled, but leaves them soft enough to be machined on an ordinary silicon grinding wheel. This grinding operation forms the nose ogive and also automatically adjusts the core to its proper length. Following inspection, the cores again travel by tray and conveyor to the final sintering furnaces. This last heat treatment, which takes less than

eight hours, shrinks the cores about 18 percent and gives them their almost diamond-like hardness.

The cores cool in the graphite boats while on conveyors traveling to the next inspection center. There they are given a wet-dry weight test and checked for length and runout; then conveyed to another station for a transverse rupture test, which is a preloading under 80,000-pound pressure. From here the cores are palletized and trucked to the final machining line for rough and finish grinding by a pair of centerless grinders. The cores are checked again; those that pass are conveyed to final inspection. Cores needing slight adjustments on nose or base are grouped according to the work that must be done and passed by conveyor to the proper machine and to final inspection.

URGES PLANNED INSTRUMENT CONTROL

A prediction of the day when 15 percent of industry's outlay for machinery and equipment will be necessarily spent on instruments of measurement and control was expressed by Henry F. Dever, president of Brown Instruments Div., Minneapolis-Honeywell Regulator Co. Occasion was a recent meeting of the Boston Society of Security Analysts. Mr. Dever further suggested that, in some industries, instrumentation could conceivably be considered a self-liquidating project. Cost of such controls could be offset by contraction of inventories and stocks of goods in process, with a consequent release of funds; lower maintenance costs; improved quality and reduced scrap loss.

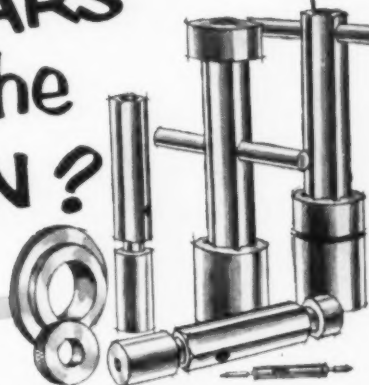
Possibly the next great advance in the field will be the engineering of whole processes of manufacture instead of individual machines alone. The entire factory, he said, must be engineered to controls to the end of the greatest satisfaction for the least expenditure of human effort, and—in the distance—he anticipated the possibility of the 'automatic factory.' In these, he said, advance planning would integrate instrumentation into the selection of equipment prior to actual start in a factory. 'System engineering', as he called it would be the joint responsibility of the user, the contracting engineer and the equipment manufacturer.

Speaking in the same vein earlier in the year before the annual instrumentation conference at Texas A&M College, Mr. Dever pointed to national statistics as one of the urging factors toward this type of thinking. Between 1940 and 1950 he explained, the nation's population climbed some 20 million, and is likely to grow that much again in the next 10 years. "By the time these youngsters grow up our labor force, big as it is, will be hard pressed to meet the new demands for cars, homes, clothing, food, or any of the things people want. Automatic controls and industrial instruments can be utilized to ease this productive burden, the better if they are engineered into each new production facility at the outset rather than merely 'applied' after a process has been set up."

IMPROVE RHODIUM PLATING

Method for electroplating relatively heavy layer of rhodium has been made available commercially by Technic Inc. According to Armour Research Foundation, who reported the treatment, rhodium has been limited in the past to very thin plating thicknesses. This technique is said to achieve thicknesses of hard wear-resistant metal up to 0.001 in.

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Model A-250, 250-amp, floor-mounted unit for production plating of small parts in greater quantities or larger parts with areas up to 125 sq. in.

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WESTINGHOUSE ORGANIZES DEPARTMENT— BUILDS FOR PEACETIME ATOMIC WORK

A concrete step in the direction of investing in, and investigating, industrial utilization of atomic power has been taken by Westinghouse Electric Corp. with its plans for a multi-million dollar plant to produce atomic equipment. The plant will be operated by a newly formed Atomic Equipment Department functioning in the Atomic Power Division which was formed in 1948. It is believed to be the first major private enterprise of its kind, and will

be located near Pittsburgh.

Announcement of the project, made by Gwilym A. Price, president of Westinghouse, following a meeting of the board of directors, indicated the plant will engineer, manufacture and sell products that have been developed for atomic power plants. He explained further that the step expressed a belief that "private enterprise generally will become an increasingly important factor in the future development and applica-

tion of nuclear energy in its nonmilitary aspects." However, for the present, the department's products will go to government atomic projects. William C. Miller will be manager of the department.

In outlining activities to be carried on, it was stated that products of the new plant will be special items which could not logically be produced by existing Westinghouse operations. Along this line, it already is well-known that the company's work on the atomic submarine reactor project has involved development of many unusual types of equipment. Among this equipment has been "canned" motors to drive pumps in hermetically sealed systems, and other special-purpose items associated with nuclear reactors and which had never previously been made.

Temporary offices for the department are located in McKeesport, Pa., but will be moved to the new plant which is scheduled to be erected on a site now part of the Harmar Golf Course near the Pennsylvania Turnpike. Mr. Charles H. Weaver, manager of the Atomic Energy Division, emphasized the fact that the work to be done there will be primarily design and mechanical operations, thus involving no hazard to surrounding area.

Approximately 200 persons probably will be employed by the plant, which it is hoped, will be ready for late fall operation.

MATERIALS HANDLING ON THE UPGRADE

A steady increase in the future is the happy forecast for the materials handling industry voiced by Sheldon K. Towson, president of the Elwell-Parker Electric Co. Reviewing the past, it has grown to a multi-billion dollar industry from a birth no longer ago than the 1920's—and, as we know it today, from a rejuvenation as recently as during World War II when it became vital to improve existing handling techniques. Today it is a multi-billion industry which "will continue to prosper because it has made an important contribution to American business. It allows men to handle more goods, with greater safety, in fewer man-hours and at lower costs."

Mr. Towson pointed out that several parallels may be drawn between the materials handling industry and the machine tool industry, and with this in mind, a bright future may be predicted for the former since the machine tool industry is still going strong after more than a century of activity. However, he added that the future of the business will hinge largely on its ability to sell an answer to a specific problem rather than a basic product in addition to high-quality equipment.

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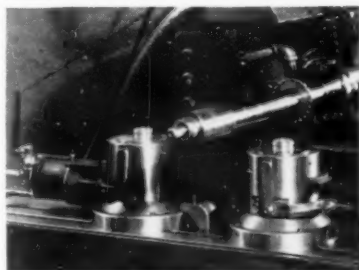


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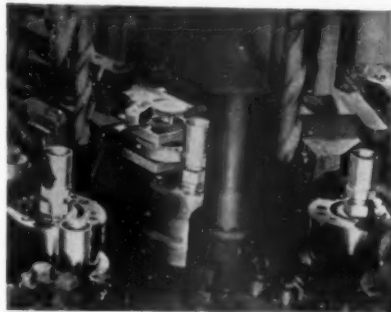


INDICATE A-5-115-1

May, 1953

ECONOMY WITH AUTOMATION

Another example in the lengthening list of automatic devices, this 6-spindle Greenlee screw machine uses an automatic roll marker in the fourth position to mark parts during the machine cycle. Result is elimination of separate parts



marking setup with consequent lower unit production cost. In this case, a 17-figure patent number plus a trade mark are being imprinted on aircraft hydraulic hose coupling nipples by the marker which advances, marks the part, withdraws and then resets ready for the next part. Record indicated that more than 270,000 nipples had been produced from standard screw stock without noticeable wear of the roll marker die. Manufacturer of the die is New Method Steel Stamps, Inc.

PROVES SAVINGS THROUGH RESEARCH

Research and standardization are possibly the most vital effective means of fighting increased cost in the industrial field. This was the point made by J. K. Hodnette, vice-president of Westinghouse Electric Corp., speaking recently before the Public Utility Buyer's Group of the National Association of Purchasing Agents.

In elaborating on his statements, Mr. Hodnette revealed several points of interest to the industry in general. Westinghouse, he said, had spent "much more money" on research and development during 1952 than it earned in net profit. Justification for such spending for research is the fact that it resulted in cut costs of installation, operation and maintenance for the company's industrial and utility customers and brought direct savings reflected in price.

In standardization of equipment, he said, industry finds its most effective means of battling increased costs. Pointing to his own firm as an example, Mr. Hodnette stated that although rising material and labor costs have erased the possibility of actual price reduction, if it were not for standardization, steam turbines would be selling for at least five percent more than at present.

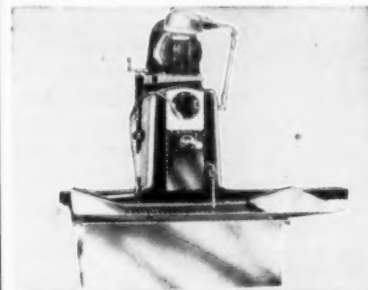
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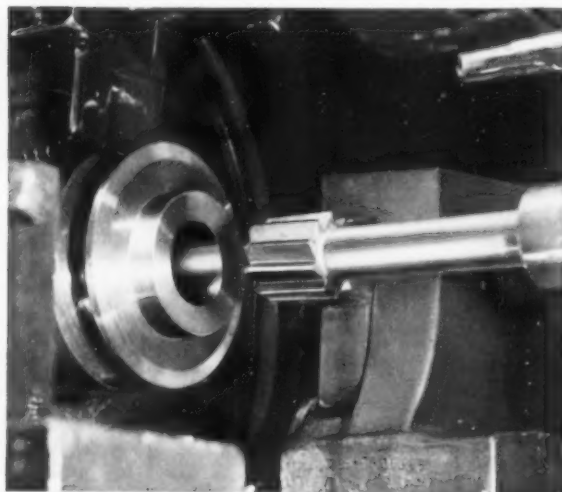
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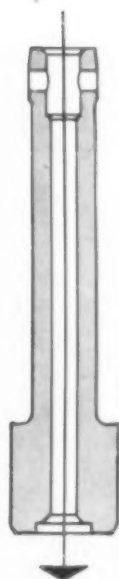
REAM FINE FINISHES

ON SCREW MACHINES AND TURRET LATHES



20-25 Micro-inch Finish

Reamed finishes never considered possible are now obtained on regular production runs with Barber-Colman Oil-Feed Reamers. On this job, 1000 pieces were reamed to a surface finish of 20-25 micro-inches before it was necessary to sharpen the reamer. Feed used is 1.75" per minute at 280 rpm., requiring 30 seconds to ream the 7/8" length of cut in AISI C1137 steel.



Oil-feed

An outstanding feature of these reamers is that oil feeds through the body of the tool to flush away chips from the cutting area. Other types of reamers tend to pack chips in front of the reamer, increasing the chance for "pick up" which often ruins finish and shortens tool life. As oil hits the end of the hole, it is forced back between the flutes carrying chips with it. Another aid to extending tool life is that oil reaches the cutting area on jobs which could not otherwise effectively employ a free flow of coolant.

Irregular flute spacing, cam-controlled sharpening, sharp cutting edges—these are exclusive features on all Barber-Colman Reamers to give you smooth cutting, fine finishes, precision hole accuracy and high rates of production. Consult Barber-Colman engineers on your Hole Finishing Problems.

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ENGINEERED STORAGE

A new die storing system developed by Pittsburgh Forgings Co. not only makes a much easier and more efficient operation of die handling, but effectively increases the desirable floor space by conserving storage area.

Under the old handling and storing system, dies were stacked two high with each pair resting directly on the pair beneath it. Each pair of dies was handled by a sling chain from an overhead, short-span chain hoist equipped crane. These dies, even though they were placed as closely adjacent to each other as possible, still consumed a storage area of over 6,400 square feet. With the old method it was difficult to keep track of the dies and sometimes as many as four or five stacks had to be moved to get at the die that was required for a specific operation. All die storage was out of doors which meant that the dies had to be thoroughly greased for protection against weather. Winter ice often locked dies together and increased the difficulty of efficient handling.

With this system of storage the company uses Yale & Towne Fork lift trucks to stack dies in specially designed racks which are placed on both sides of the aisle in a saw tooth arrangement. This saw tooth 45-degree angle stacking arrangement allows the trucks to operate in a minimum width aisle and also facilitates the handling of dies into and out of storage.

ORGANIZED STACKING CONSERVES SPACE

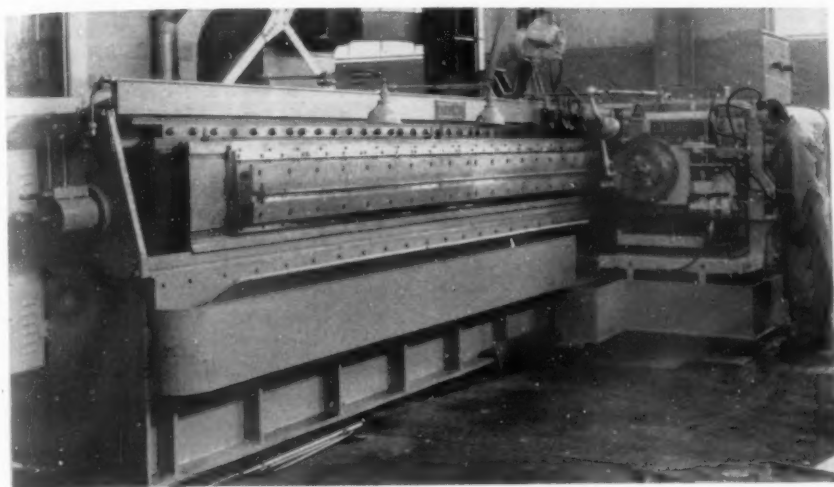
The dies being handled are matched, male and female, and are dovetailed so as to index on the anvil and on the ram of the hammer. Thus, the truck with adjustable forks can pick up each pair of dies and transport the units in and out of storage without palletization. Individual loads run as high as 3,260 pounds. Each shelf is capable of storing up to 7,800 pounds.

The side shifting attachment with which these Yale trucks are equipped serves to further conserve space and time by making it possible for the operator to shift his load either right or left without jockeying his truck. This side shifting feature also allows the operator to work with a much smaller turning radius and permits flush right and flush left stacking which further conserves the space necessary for storage.

In addition to substantial amount of time, and consequently money saved by this system, savings in space have reduced the 6,400 square feet of die storage area formerly required to 1,600 square feet of floor space. Capitalizing on this, Pittsburgh Forging Co. has enlarged its machine shop to take in the amount of storage space freed.

The Tool Engineer

Tools of Today



Horizontal High Speed Broach

Broaching at any speed up to 200 fpm is the possibility of the single ram horizontal type Lapointe broaching machine equipped with variable speed electric drive. It is this electric drive that accounts for the versatility and flexibility of the machine, built by the Lapointe Machine Tool Co., Hudson, Mass.

It is a known fact that there must be proper correlation between speed and material. A material that can be broached satisfactorily at 80 fpm may not be worked satisfactorily at 90 or 70 fpm. This machine offers an opportunity to make tests so as to determine the best broaching speed for any particular metal.

Then, too, with this advance in broaching speed, three important results have been achieved: better finish, greater accuracy through freer cutting action, and increased production. Rigidity of construction of the machine is important to maintain accuracy of cut within 0.0002-inch and vibration-free operation.

Carbide-tooth broaches can now be used with confidence at these higher cutting speeds which are obviously in the carbide range. Recent developments have also indicated that HSS broaches of proper design will give good tool life and excellent finish at higher speeds than were thought possible six months ago.

To obtain satisfactory results, several factors require careful consideration. First, the broaches must be properly designed. Then, there must be proper coolant, properly applied. It is apparent

that for a machine of such cutting speed and 170-inch stroke, the horizontal design is the only practicable one, not only because of space considerations, but because it minimizes the problems of applying coolant, removal of chips and ease in handling broaching equipment.

Using the same fixture, this machine has been tooled up to take all 16 compressor stages plus three turbine stages of a jet engine. Changeover from one stage to another can readily be made. It is relatively easy to remove the adapter and change broaches. Another advantage is that the broaches are at eye level and can be examined at any time. Production is at the rate of three finished slots per minute, with a finish held within 0.0002 inch.

The motor-generator set is of the modern type, compact, and designed to permit its assembly on the machine at almost any place desired to meet individual requirements. A feature of this electric drive is that pulsation marks are eliminated.

This Lapointe electric drive horizontal broaching machine can be furnished with dual speed and/or dual cycle (Lapointe Pat. No. 2,617,333). Strokes from 170 to 230 inches are obtainable, and even down to 90 inches if desired.

T-5-1171

USE READER SERVICE CARD ON PAGE 139 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

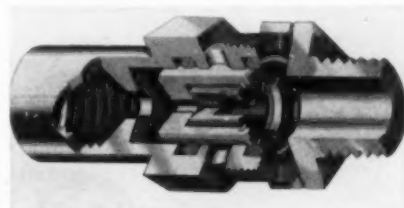
Gearless Power-Saw

The Acro saw attaches to electric or air drills for power. A specially designed wobble-shaft arrangement converts the rotary action of the drill to a fast reciprocating motion. Ball bearings reduce vibration to a minimum. The unit attaches directly to drill spindle, or may be secured in the drill chuck. It fits both $\frac{1}{4}$ and $\frac{1}{2}$ inch drills. By simply inserting saw-blade in the holder and turning on the drill, a rapid $\frac{7}{8}$ -inch stroke does the cutting. Saw-blades with specially arranged teeth are available for cutting stainless steel, Monel and other metals, as well as wood, plastic, etc. The operator can guide the saw to cut any curve or angle as desired. It cuts directly into wood without drilling a starting hole. Full length blades are used to make it easy to reach into hard-to-get-at-places. Power-filing is accomplished by inserting file instead of the saw-blade. Moving parts are of hardened steel, permanently lubricated. The housing is made of a special sturdy alloy for light weight and easy portability. Write for Bulletin 77 from Acro Tool & Die Works, 4554 Broadway, Chicago 40.

T-5-1172

Quick-Release Valve

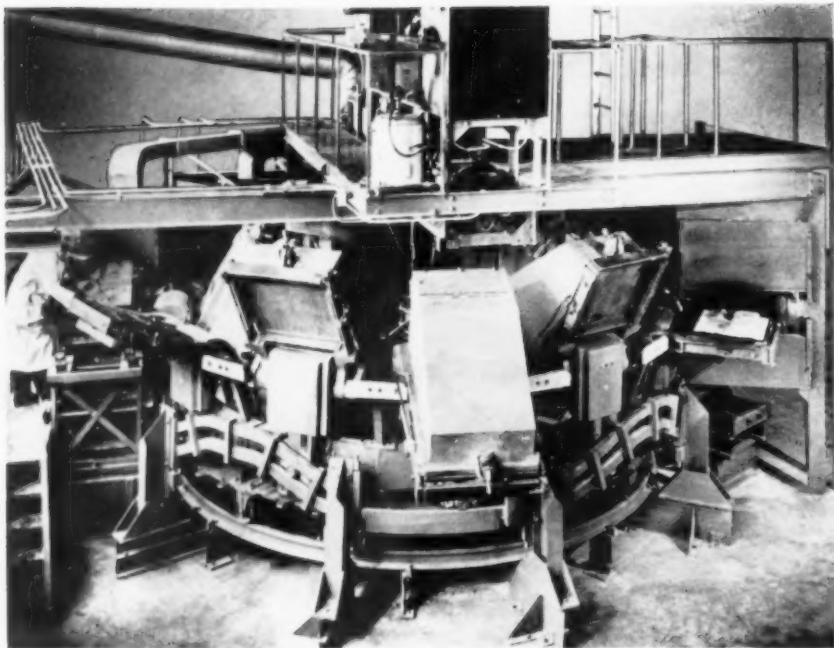
A quick-release valve which does not chatter has been announced by Deublin Co., Glenview, Ill.



Designed to handle air pressure from 0 to 250 psi on pneumatic clutches up to 1500 horsepower, the Deublin valve introduces innovations in design and performance, it is stated.

According to the announcement, features include light weight and compactness which permit its use on rotating elements without disturbing dynamic balance; a built-in orifice which prevents accidental removal of orifice from the line and eliminates the possibility of pressure equalization responsible for chatter; double-piston design for smooth, positive, quick-releasing action; distinctive construction eliminates the need for a spring.

T-5-1173



Shell Molder

A twelve-station unit, designed and built by Mechanical Handling Systems, Inc., Detroit, will make approximately 500 shell molds per hour. The machine is automatic, requiring only one man for operation. Pattern size on

the standard machine is 28 x 22 inches.

Operation of the unit is smooth and continuous. A finished shell mold is removed from the pattern. Next, the pattern carriage moves up and engages the sand-resin hopper. Pattern and hopper, clamped tightly together,

swing forward to below the horizontal, the material falls on the pattern and the shell mold is formed.

Pattern and hopper now rise, the hopper is disengaged, and the pattern carriage, with its soft shell mold, returns to the horizontal and enters the oven. The mold travels through the oven, which is heated with gas-fired radiant burners, and is fully cured when it emerges. The mold release pins lift automatically, the mold is removed, and the cycle starts again.

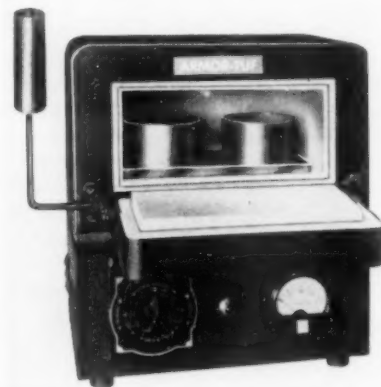
At the top of the machine is located the automatic proportioning system for sand, resin, and wetting agent. These materials are thoroughly mixed and are deposited in controlled quantity in the hoppers at each revolution of the machine.

Pattern plates may be changed quickly, without stopping the machine, which provides for flexibility of production. The machine may be operated with all patterns producing the same molds, or with twelve different patterns.

T-5-1181

Electric Furnace

A small electric furnace designed for maintenance and small parts production has been offered by Armor-Tuf Sales Corp., 299 Madison Ave., New York.



The furnace was designed primarily for use in the hardening of tools and steel parts with Armor-Tuf, the steel hardening compound made by this company, but it has many other uses.

Heat treating, enameling, chemical drying, wax burnout, and other applications can be found in the laboratory or experimental shop, as well as in maintenance and production.

This electric furnace attains a temperature of 1800 F from an ordinary wall socket line of 110-120 volts ac. The inside dimensions are 4 3/8 inches deep by 4 inches high by 9 inches wide. It is fully automatic and is built for hard usage.

T-5-1182

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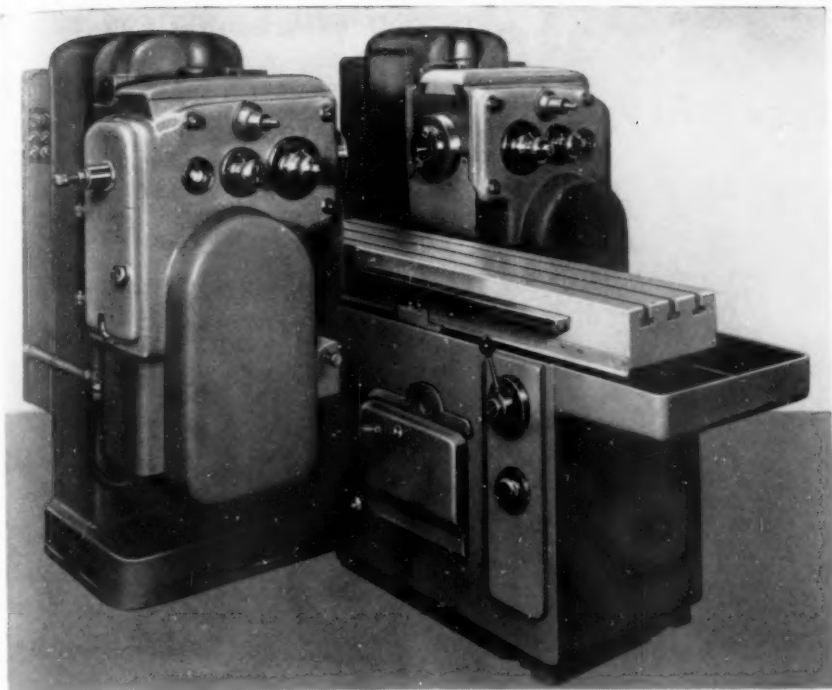
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Automatic Milling Machines

A line of automatic milling machines has been announced by The Cincinnati Milling Machine Co. These machines are built in plain, duplex, and plain rise-and-fall styles; powered at the spindle by 3 or 5 hp motors. Standard table travel is 24 inches although longer table travel, up to 144 inches, may be obtained for long, comparatively light work.

Automaticity and manual maneuverability have been combined. Through a cycle selector unit, a single lever initiates the complete milling operation, including automatic table cycle, automatic spindle stop, automatic backlash eliminator automatic spindle carrier cycle of RAF machines, and one extra equipment item, automatic spindle retraction. To aid in setting up the machine, all these automatic features can be nullified or bypassed for manual control.

An individual motor drives the spindle through V-belts and three gear contacts, 3 hp per spindle for standard spindle speeds, and 5 hp for high spindle speeds. The spindle is quill mounted for cross adjustment. Bearings, gears, and all other parts within the spindle carrier unit are automatically lubricated by means of a combination circulating and splash system.

Table ways are automatically pressure lubricated with filtered oil, and completely protected against entrance of dirt, chips, and coolant. The standard table is extra long, 55 $\frac{5}{8}$ inches from end to end, affording an extra measure of working area. Dogs are

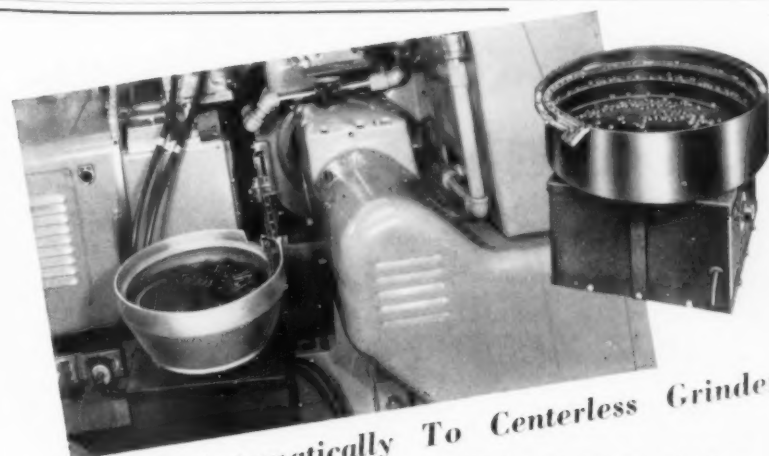
carried on the underside of a rail attached to the front of the table, where they will not be fouled with chips.

The lever for starting the automatic operating cycle has four power manual directional control positions. In the same unit, a second lever controls the vertical traverse of the spindle carrier of RAF machines.

Automatic table cycles feed right or left, or alternately right and left with a center stop position for safety. Rapid traverse is at the rate of 300 inches per minute. Sixteen table feeds, ranging from $\frac{1}{2}$ to 20 inches per minute, are obtained with change gears. Twenty spindle speeds range from 30 to 1200 rpm. They are obtained through change gears and an externally operated back gear. The spindle speed change station is equipped with a safety contact button to protect the operator.

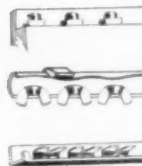
Vertical feeds for the spindle carrier of RAF machines are infinitely variable from 1 to 40 inches per minute, obtained through a dial control. A built-in automatic backlash eliminator device for the table feed screw is also actuated by the cycle selector. It is engaged during the vertical feed cycle and while the table traverses at a feed rate, it is automatically disengaged at other times.

Complete data is contained in a 28-page catalog, No. M-1760, available from The Cincinnati Milling Machine Co., Cincinnati 9, Ohio. **T-5-1191**



Slugs Fed Automatically To Centerless Grinder
with **SYNTRON**

PARTS FEEDERS



Small parts emerge from feeder trough in desired position, one at a time, at variable controlled speeds.

Providing completely automatic, oriented, single file feeding to grinding, packaging, inspecting, and many other automatic machines—Syntron Parts Feeders greatly increase capacities and speeds for production handling of small parts. Economical—compact—easy to install.

WRITE FOR COMPLETE CATALOGUE DATA—FREE

SYNTRON COMPANY

340 Lexington Ave.

Homer City, Pa.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-119

KELLER Air Tools

Speed TV Assembly



ANOTHER EXAMPLE OF
KELLER Air Tools engineered to industry

Keller Screw Drivers and Nut Setters, conveniently mounted in "scabbards" along the edge of the workbench, have reduced the cost of assembling these TV sets 50% or more.

FACTS IN BRIEF

ABOUT KELLER PNEUMATIC SCREW DRIVERS

Consume less air

Wide variety of handles, gearing, torques, speeds

Reduce operator fatigue

Weigh less

Interchangeable parts

Need less "back-up" in the tool room

Attachments, clutches, finders, and bits, for every purpose



Send for
FREE 36-Page Booklet
for more information and interesting
ideas on air tool application

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet on
Pneumatic Screw Driving and Nut Setting Tools

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____

120

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-120

Horizontal Motor

Varidrive motors are now available in horizontal assembly up to 30 hp through the addition of a horizontal frame size. The 64 VE possesses all the features of the upright 64 Varidrive including all-in-one construction (motor, variable speed transmission and gearing when



necessary), microspeed control and indicator, splined Varidisc sheaves, double cog Varibelts with Autotaut tension control for permanent belt adjustment, dual belt construction, asbestos-protected motor and normalized castings. This Varidrive is also available in combination with the U. S. Syncrogear with either single or double reduction gearing.

Motor controls may be located above or at the side of the motor. Remote controls are available either with mechanical extensions or electric push-button stations. Varidrive motors are offered in ratings from 1/4 to 50 hp with speed variations up to 10:1 and speeds from 2 to 10,000 rpm. For further information, write to U. S. Electrical Motors, Inc., Box 2058, Terminal Annex, Los Angeles 54. **T-5-1201**

Counterbore

High speed counterbores and spot facers with interchangeable pilots have recently been added to the regular line of metal-cutting tools manufactured by the Butterfield Div. of Union Twist Drill Co., Derby Line, Vermont.

Four styles of standard counterbores and spot facers are being manufactured, long and short set in both straight and taper shank while two additional styles are made especially for the aircraft industry. The short set style with 1/4-inch shanks are designed for use with portable equipment such as hand drills.

To insure rigidity and permanent alignment all styles are made with the cutter and shank integral, with the cutting edges well backed. Pilots are carefully ground from high grade alloy steel and are manufactured in two styles, one for the standard counterbores and spot facers and another for the aircraft styles. **T-5-1202**

The Tool Engineer

Single Spindle Automatic

The New Britain model 126 offers many production and operation advantages because of three special features: program drum, automatic transmission with universal turret cam, and standard cross slide wedge cams actuated by the turret motion.

The program drum is the nerve center or brain of the Model 126. It is from this central control station that the operations of cutting off, unchucking, stock feeding stroke are governed. Preset strip cams and five limit switches positively time all these movements in proper and accurate sequence. The drum is divided into five sections, one for each side of the turret, and bears a scale on each feed section reading directly in inches of turret stroke.



Also mounted on the drum are five shifter arms which, during the high-speed cycle, automatically preselect any one of 10 feeds for each of the five turret stations. This automatic choice of feeds is made possible by the automatic transmission.

The program drum, then, permits the operator to set his high speed and low speed cycles quickly and easily, choose the exact length of feed stroke, and preselect the feeds for each of the turret stations without changing feed gears.

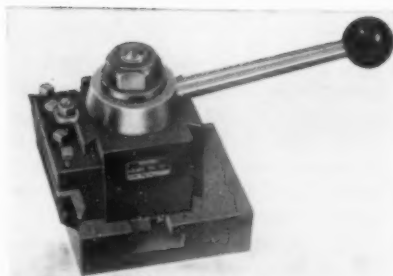
Cross slide cams are sine bars or wedges mounted on the front of the turret. When the turret feeds forward, the wedges are moved ahead under the spherical rollers on the ends of the cross-slide arms. As the rollers ride up the cams, the cross slides feed in.

With such a combination of motions, it can easily be seen that figuring cross-slide feeds and cams is simply a ratio of turret feed to cross-slide feed. Cams are made in four standard ratios or sizes: 1/10, 2/10, 3/10, and 4/10. Made by The New Britain Machine Co., New Britain, Conn. **T-5-1211**

Tool Post

The Aloris Tool Co., Inc., of 80-82 Fourth Ave., New York has developed a tool post that will fit all lathes regardless of style of compound rest top.

This tool post comes with five quickly interchangeable toolholders, one for



each of the following operations; turning, threading, drilling, cutting-off and boring. These toolholders can be changed in a matter of seconds by simply sliding out one holder and

slipping in another to the exact original preset position without changing the setup. This feature permits the re-sharpening of the tool bits right in the holder. A stud screw is provided on each toolholder for precision height adjustments, entirely eliminating the use of shims. The rigidity of this tool post and toolholders assures efficient work especially when using Carbide tool bits.

The Aloris tool posts are made in three sizes with tool bit capacities ranging from 1/4 to 1 inch and capacities of boring bars from 1/4 to 1 1/2 inches. **T-5-1212**

DRILL HEADS

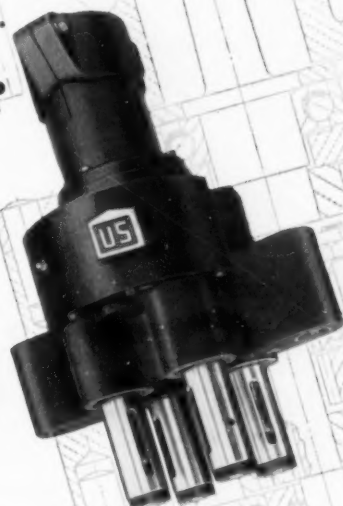
Expertly Designed

to Fit YOUR Needs For...

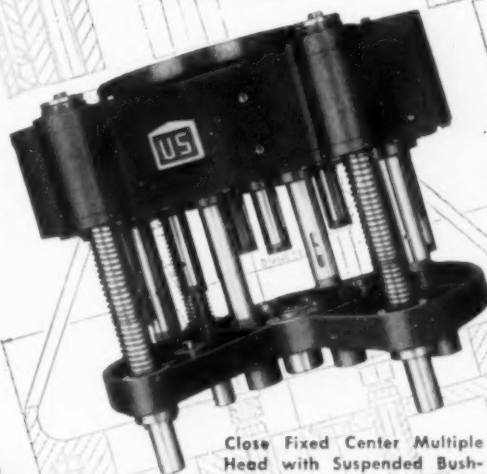
**DRILLING • TAPPING •
SPOTFACING • REAMING •
BORING**



Fixed Center Oil Circulating Spindle Head with Vertical Adjustment Spindles. Designed mainly for high speeds.



Standard Fixed Center Construction. Bushed Guide Rod Holes and Lifter Rod Holes with Vertical Adjustment Spindles.



Close Fixed Center Multiple Head with Suspended Bushing Plate.



SINCE 1915

UNITED STATES DRILL HEAD CO. • CINCINNATI 4, OHIO

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-121



Are you interested in saving up to 50% in your inspection time, also extending for many years the useful life of expensive gage blocks?

The above is being accomplished in many of the largest manufacturing companies in the country by the use of the Pioneer Tool gage block jack.

Designers and manufacturers of tools, dies, gages, fixtures, special machines, optical checking equipment and precision instrumentation parts.

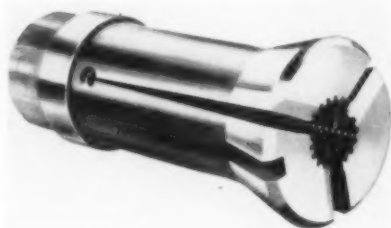


PIONEER TOOL & ENG. CO.
3914-18 W. Shakespeare Ave.
Chicago 47, Illinois
INDICATE A-5-122-1

Self-Cleaning Collet

A self-cleaning collet on which patents are pending has been introduced by Sheffer Collet Co., Traverse City, Mich. The collet is designed for use on automatics, turret lathes and other machines where the collet is used in a rotating spindle.

Coolants and cutting oils, along with solids picked up by the solutions, collect in collet slots, forming a sludge and clogging the collet and chucking and feeding mechanisms. It likewise works in behind the workpiece and



passes along the collet tube to the rear of the spindle where it dilutes the lubricants and causes damage to gears and other parts of the machine. Felt wicks used in the slots to prevent this condition have proven only partially effective, and are eliminated by the new design.

The self-cleaning feature consists of an inclined plane on the following edge of each slot face. Instead of an edge which collects foreign matter, the angular surfaces act as fan blades which forcibly repel it.

On production tests Sheffer self-cleaning collets have been running for many months with no indication of fouling. On the same jobs it was formerly necessary to remove the collets for cleaning at least every two weeks because of functional difficulties caused by accumulation of sludge and grime in the spindles, according to the company.

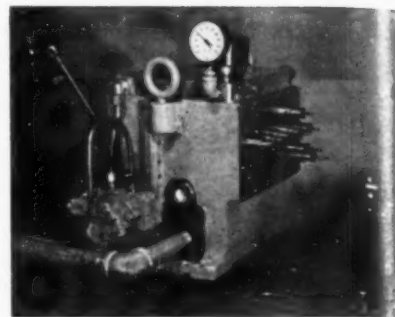
T-5-1221

Work Rest Blades

The Ohio Knife Co., Cincinnati 23, is offering a complete line of centerless grinder work rest blades and guides. Present day high production schedules, particularly on centerless grinders require blades which will give long runs and reduce costly down time.

Ohio Knife's special heat-treating on high-speed steel blades assures extreme hardness and long life. In addition, high finishes and close tolerances are achieved. Inserted carbide blades are a specialty. Blades of cast alloys or iron are also available. In addition to standard sizes, blades with special contours, angles or shapes are available. Write Dept. 33, The Ohio Knife Co., Dremen Ave., Cincinnati 23,

T-5-1222



An ultra precision multi-spindle head of a unique design adaptable to an Excello, Heald or Stoker-Unit Horizontal-Precision Boring Machine.

One ten thousandth tolerance on diameters of bores and plus or minus one ten thousandth tolerance on center distance between bores.

These special heads will cut your direct labor costs and increase production per machine.

Send in your inquiries for further information.



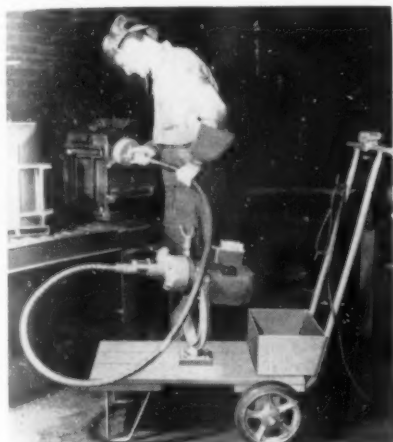
Designers and manufacturers of tools, dies, gages, fixtures, special machines, optical checking equipment and precision instrumentation parts.



PIONEER TOOL & ENG. CO.
3914-18 W. Shakespeare Ave.
Chicago 47, Illinois
INDICATE A-5-122-2

Portable Mounting

The truck mount for Strand flexible shaft machines, consists of a hand truck with wheeled rear axle and front skids. Users of this new mount secure maximum portability and eliminate possible damage to the flexible shaft machine caused by the operators' habit of pulling the machine by the flexible shaft from point to point.



The flexible shaft unit itself is mounted on the deck of the truck in such a position that one operator can easily push the unit from place to place by merely pressing down on the handle to lift the front skids from the floor. The handle of the mount is equipped with a fixed clamp that holds the hand-piece and tool of the flexible shaft unit. Thus, the equipment can be used as a fixed bench tool or a portable tool. The deck of the truck itself is fitted with a metal box for carrying a complete set of tools and attachments along with the machine.

Further information may be obtained by writing Franklin Balmar Corp., N. A. Strand Div., Woodberry, Baltimore 11, Maryland.

T-5-1231

Screw Steel Stock

A free-machining screw steel for making screws, nuts, studs, bolts, and other small machined products, is now being produced by the open-hearth process by Jones & Laughlin Steel Corp. The new steel is furnished in the form of cold-finished bars.

The J&L 1200 series is of analysis comparable to the 1200 series steels listed by the American Iron and Steel Institute and approved by Federal agencies. It meets specifications for the SAE 1100 series listings.

The greater uniformity of the 1200 screw stock is the result of the closer control of chemistry and temperature and the larger heat size possible in the modern open hearth furnace.

T-5-1232

Production News

ABOUT *Lusol*..—THE ALL-CHEMICAL METAL-WORKING SOLUTION

FROM F. E. ANDERSON OIL COMPANY, INC. • PORTLAND, CONNECTICUT

The product is **RESTRICTED** but the *STORY* of this "Production-Booster" can be told

"A serviceman, in our plant to repair a turret lathe, found us having trouble machining 86-40 steel tubing. We had already tried seven different cutting oils without success, but he said 'Try Lusol.' It proved to be a revelation and a very happy day for us. Not only were we able to lengthen chaser life manyfold per grind, but also boring, cutting and facing-tool life increased correspondingly."

Their Success Story Continues:

"After this amazing performance, we tried Lusol in a battery of double-end boring and tapping machines. Our results duplicated those on the turret lathes . . . We then put Lusol in our Marvel hacksaws, whereupon bad odor disappeared immediately, all smoke was eliminated and saw life was better than doubled.

"Our next experience with Lusol as a coolant was on Cincinnati centerless grinders. Again we noticed a tremendous increase in life on both grinding and regulating wheels. Then we adopted it for general drilling and tapping operations, lathes and production milling machines. *We consider ourselves fortunate to have been introduced to Lusol.*"

LUSOL'S BEEN WORKING HERE 2 YEARS

Good housekeeping, we're frank to say, has a lot to do with Lusol's fine performance here. A clean machine enables this unusual metal-working solution to retain the properties that make it different—faster heat dissipation, a longer useful life, no odors, no gumming, no skin irritation.

You're aware of good housekeeping from the moment you enter this plant—from the cutoff saws, where Lusol gets in its first lick at cleaner, faster production, on through to the tanks where a Lusol solution serves as a rust preventive for pressure testing their products.

Send for this FREE BOOK

"Lusol Gets to the Point" tells how to clean machines, what mixtures to use, and gives performance data. For a free copy, write on your company letterhead to:



F. E. ANDERSON OIL COMPANY, INC.

Box 213-E, Portland, Connecticut

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-123

Save Metal

Save Labor

**NILSON
FOUR-
SLIDE**

**Wire and
Ribbon Metal
FORMING MACHINES**



Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation.

Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . automatically in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for all operations! One operator!

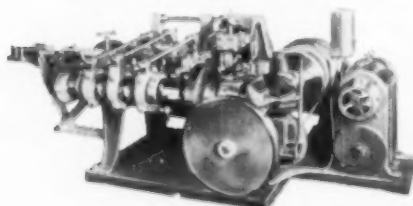
For specific recommendations . . . send details of your operation.

NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY
1520 RAILROAD AVENUE • BRIDGEPORT 5, CONN.

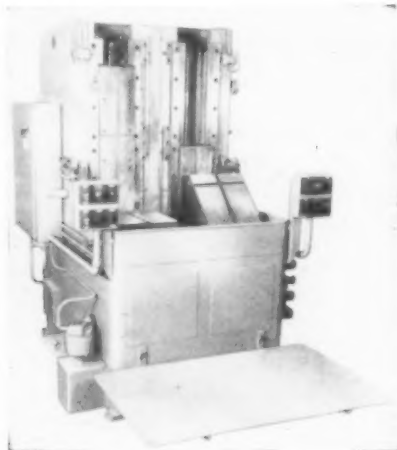
CHICAGO • CLEVELAND • DETROIT •
LOS ANGELES • HAMILTON, ONT., CANADA



INDICATE A-5-124-1

Broach

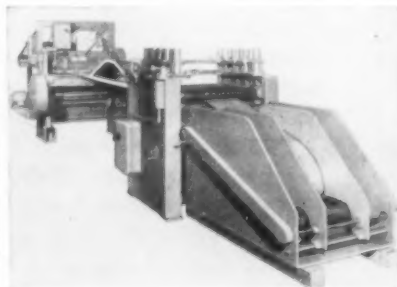
This standard American SBD-30-4, 30 inch stroke, 4-ton capacity, dual ram surface broaching machine is a new size that has been added to the standard line made by the American Broach and Machine Co., Ann Arbor, Mich.



The relatively short stroke and light tonnage of this machine makes it ideal for the surface broaching of small parts at a high rate of production. Tilting work tables provide convenient loading positions for parts. The machine can be set at either an automatic or semi automatic cycle. All electrical and hydraulic circuits conform to JIC standards. **T-5-1241**

Decoiler-Shear

Designed and manufactured by the Union Tool Corp., Warsaw, Indiana, this machine decoils, levels, shears and stacks automatically. It requires only one attendant.

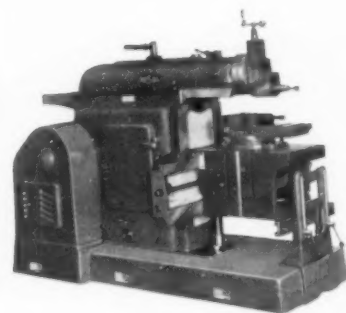


The Union automatic decoiler-shear will handle any flat material such as steel, aluminum, etc. It will work steel coils up to 13-gage; will handle widths from 6 to 60 inches. It can be set to shear lengths from 6 to 60 inches, with a plus or minus variation of only 1/64 inch. Only one adjustment is required to change lengths.

Sheared pieces are automatically stacked in an orderly pile ready for removal. Operating speeds are up to 150 fpm depending upon length to be cut. **T-5-1242**

ARISTON Shaping Machines

- **DELIVERIES** prompt
- **PRICE** very low
- **SPARE PARTS** available
- **SERVICE** nationwide



**V-type
Tool Head Power Down Feed
Automatic Lubrication**

SPECIFICATIONS:

Ram Stroke 28"—Ram Strokes per minute 9 to 108—No. of speeds 6—Feeds: Table, horizontal 31 1/2", vertical 15 1/2", Tool Head 7"—Feed range .010 to .060"—Motor HP 5

Also available:

ARISTON 540
(21" stroke)

ARISTON 620
(24" stroke)

ARISTON 870
(34" stroke)

For further information
write or call

MISAL

1 E. 53rd ST., NEW YORK 22, N. Y.
ELdorado 5-7278

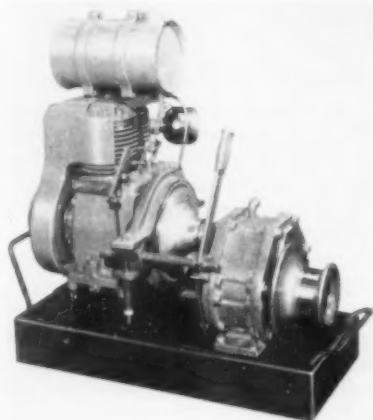
INDICATE A-5-124-2

The Tool Engineer

Winch

A lightweight portable electric or gasoline powered winch with a capstan-drum for critical control of loads has been announced.

Called the Stampco Gypsiwinch, the unit is designed as a multi-purpose hoist for fast, low-cost handling of materials. Standard models are equipped with either electric or gasoline power units ranging in size from $\frac{3}{4}$ to $7\frac{1}{2}$ hp. Two gripper type handles facilitate moving the hoist about on the job while the fabricated all-steel base may be secured by $\frac{1}{2}$ -inch lag bolts to provide a stable platform for pulling or lifting.



The unit is the first lightweight, portable winch to utilize the capstan principle, according to the manufacturer. In operation, the capstan permits accurate spotting of load, allowing the operator to skid the line by slacking off pressure while the capstan is rotating. Using this principle, a heavy load may be taken up and stopped very slowly, with no stress on rigging or equipment. A capstan line may be retrieved more speedily than a drum-line and eliminates need for level winding.

The Gypsiwinch is also available in combination with cable drum, permitting use of either hoisting cable or manila line. Gasoline and electric power units used on the Gypsiwinch are instantly reversible and operated by a conveniently located lever control. Mechanical efficiency of more than 95 percent is obtained on reduction units, allowing extremely high torque and horsepower delivery. Gears are completely enclosed for silent operation and run in a continuous oil bath. Motor, drum and pinion shafts are ball bearing mounted.

For further information, write Dept. KP, St. Anthony Machine Products Co., 2424 East Franklin Ave., Minneapolis 6.

T-5-1251

May, 1953

CONNECTICUT DURAKEEN BROACHES

DURABILITY

WITH KEENNESS



**MORE PIECES PER GRIND • MORE GRINDS PER BROACH
BETTER QUALITY WORK**

The real extent of the manufacturing economies a fine broach makes possible is still a field of rich surprises . . . especially when you mount a Connecticut Durakeen Broach on any of your machines.

From surface to core, a Durakeen Broach gives you the sharp, hard teeth with correct undercut for unbroken chip curling, the differential tooth spacing that prevents broach chatter and wave, the absolutely straight body that insures smooth, true travel. Durakeen, heat treated by skilled operators to exact exposures, is our finest steel . . . your guarantee of highest quality work. "Better Broach it with Connecticut!"

THE CONNECTICUT BROACH AND MACHINE COMPANY
NEW LONDON, CONNECTICUT

IC. 8538

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-125

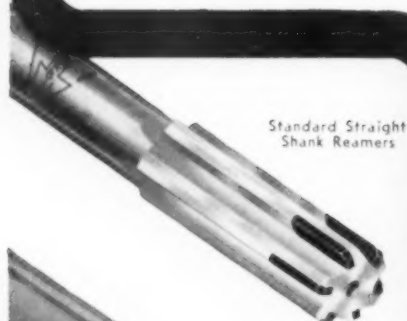


Here it is!

The new WENDT-SONIS

Carbide

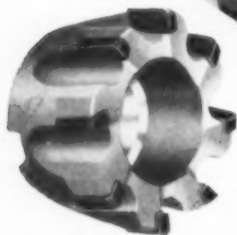
in STANDARD TOOLS



Standard Straight
Shank Reamers



Standard
Taper Shank
Core Drills



Standard Shell End Mills

Wendt-Sonis new carbide is also available in all Wendt-Sonis standard tools — tool bits, reamers, core drills, counterbores, milling cutters, end mills, and many others.

Now, more than ever, Wendt-Sonis is the one source for carbide cutting tools and blanks — another milestone in Wendt-Sonis' long experience of producing cutting tools for industry.

There is a Wendt-Sonis tool for every cutting application . . . precision tools designed to lower manufacturing costs, and increase production.



WENDT SONIS

HANNIBAL, MISSOURI

576 N. Prairie Ave.
Hawthorne, California

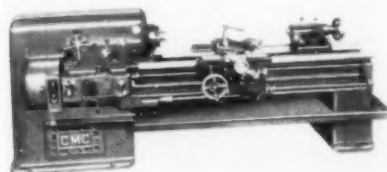
549 W. Randolph
Chicago, Illinois

THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS AND BLANKS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-126

Toolroom Lathe

This precision toolroom lathe incorporates a number of features developed as a result of several years of collecting and revising data in the field of toolroom practice, according to the company. The CMC toolroom lathe, available in 16 and 18-inch sizes, is now being sold in this country by Pitnam Industrial Products Co., Div. of Cement and General Development Corp., 608 Fifth Ave., New York 20.



A high degree of accuracy is claimed by the manufacturer. The bed is of nickel semisteel and supports the head down to the floor with no overhang. The head has 16 selective spindle speeds, using only 15 gears. It is equipped with antifriction bearings throughout, with precision bearings on the spindle, which has a long tapered key drive nose. The speed change gears are of forged nickel steel, heat-treated and precision-shaved. The large back gears are alloy steel castings. The shafts are of heat-treated alloy steel, multi-splined.

The selective system of speed changing incorporated in this model eliminates extra clutches, plain bushings and wear on gear teeth, common to the constant mesh type of gearing.

The saddle and compound rest are of nickel semisteel with intermediate cross slide for taper turning. The apron is a single piece double wall casting with built-in oil pump and all controls conveniently grouped. The design incorporates a separate lead screw and feed rod, clutch control and lead screw reverse with automatic stop, to feed in either direction, and a micrometer stop for length of cut. A safety interlock prevents feed and thread engagement together.

The quick change box has 66 rates of feed. It is equipped with anti-friction bearings throughout and has a plain change quadrant for metric, module and diametral change gears which are supplied when ordered. The tailstock has quick-acting and second nut clamp to bed, as well as round barrel clamp.

Standard equipment including steady rest, follow rest, large face plate, driving plate, head and tail centers, etc. are regularly supplied and a wide variety of extra equipment is available, including special change gears, different types of chucks and collets, reversing motor drive, etc.

T-5-1261

The Tool Engineer

Pilot Bushing

A needle bearing pilot bushing incorporating the absolute sealing principle of the Jergens pilot bearing bushing has been announced by J. G. Jergens Co., 1106 Avon Ave., Cleveland.

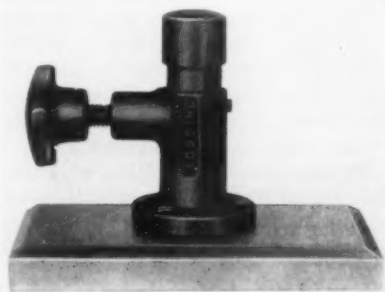
According to the manufacturer, this new needle bearing bushing provides an absolute seal against dirt, coolants and grit entering the bearing cavity. The manufacturer further states that the effectiveness of the needle bushing seal is actually increased as dirt, coolants and grit enter the outer seal. In addition, these needle bearing bushings permit closer center distances than roller bearing type bushings.

These needle bushings can be disassembled without removing the housing and they protect against thrust loads as well as radial. Adaptable to keys or keyways, the over-all length of the bushing offers greater bar support. **T-5-1271**

Spring Jack

A standard-model spring jack for all-purpose use in metalworking plants is now being manufactured by Lodging, Inc.

The jack is designed as a work support for materials or parts being machined. Standard in design and usable in many ways, the spring jack makes it unnecessary to design and build special jacks for many jobs.



Operation of the jack is simple. The plunger, actuated by the spring, makes contact with the work without requiring manual pressure. After contact is established, the plunger is locked by the hand-operated screw. The hardened shoe registers against the tapered section of the plunger, preventing any movement.

A dust cap on the jack protects the working mechanism against chips and dust. All parts are coated with Parkerized jet black finish and will not rust. Plunger and shoe are made of hardened and ground tool steel. It is available in two models, a button base model and a flange base model.

Additional information may be obtained by writing to Lodging, Inc., Dept. N 40, 79 Beacon St., Worcester 1, Mass. **T-5-1272**

May, 1953

Here they are!

The new WENDT-SONIS

Carbide BLANKS

Wendt-Sonis now adds a brand new line of carbide blanks to its complete line of cutting tools.

Eight styles are available including reamer blanks, solid round blanks and center tips. A wide variety of grades, sizes are also available.

Research and on-the-job testing have proved that these new Wendt-Sonis carbide blanks reduce production costs.

Write for new "Tooling Tips" folder, containing complete details and prices for the new carbide blanks. Send a post card to Dept. T.

Style 4000

Style 3000

Style 2000

Style 5000

Reamer Blanks

Solid Round

Center Tips

Mechanically Held Carbide Inserts Are Also Available

WENDT SONIS

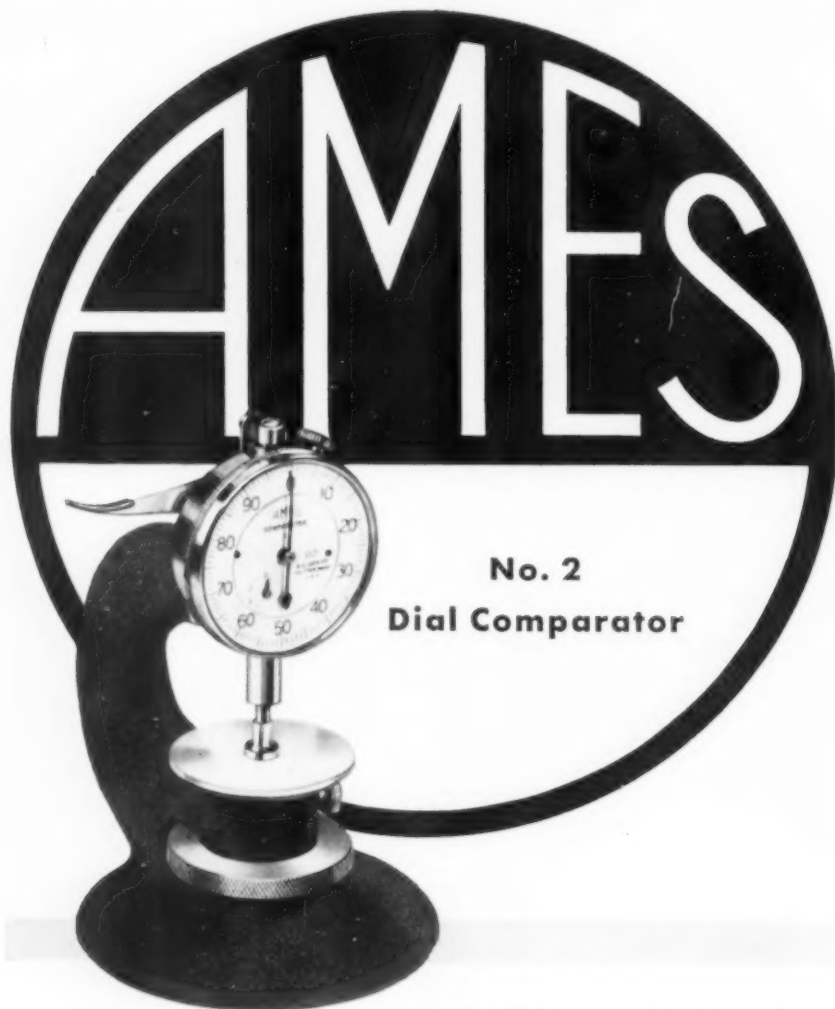
HANNIBAL, MISSOURI

576 N. Prairie Ave.
Hawthorne, California

549 W. Randolph
Chicago, Illinois

THE MOST COMPLETE LINE OF CARBIDE CUTTING TOOLS AND BLANKS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-127



**No. 2
Dial Comparator**

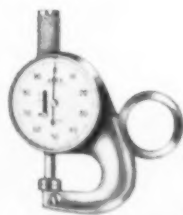
This is smallest in the Ames' line of high quality dial comparators and it is ideal for desk or bench use in the fine inspection of small precision parts. It is light in weight, but its broad base makes it very stable. The capacity approximates that of the regularly supplied Ames No. 202 Dial Indicator which has a dial numbered 0-100, graduated in .001" and with a .250" range.

Should your job requirements differ, you can have the No. 2 with any Ames "Hundred Series" Dial Indicator. Send for Ames Catalog No. 58 covering the entire line of Ames

Top Quality measuring instruments or, better still, send complete details of your Quality Control problem. Ames will suggest a solution - no obligation, of course.



Ames Long Range Dial Indicator No. 2822



Ames Dial Micrometer No. 516



Ames Dial Comparator No. 130



Ames Caliper Gauge No. 12B



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Representatives in principal cities.

B. C. AMES CO. 30 Ames Street Waltham 54, Mass.

Mfr. of Micrometer Dial Gauges • Micrometer Dial Indicators

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-128

Pyrometer Controller

For automatically controlling the temperature of batch processes or equipment suitable for two-position control action, Thermo Electric Co. Inc., Fair Lawn, N.J., is introducing an electronic pyrometer controller for use with iron constantan, chromel alumel, or platinum platinum-rhodium thermocouples. Twelve standard scale ranges are available for controlling temperatures from 0 to 3000 F.



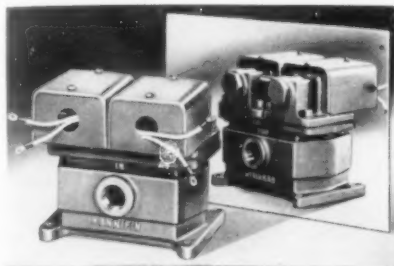
This instrument combines the measuring accuracy of a null balance potentiometer circuit with the sensitivity and speed of an electronic control system, which provides continuous and high-speed control action. It has only one moving part, a magnetic control relay, which throws positively when the process calls for a change of heat. The detection of temperature deviations is simultaneous with the measurement in the potentiometer circuit; the control signal is amplified electronically and the control relay is operated electrically. High sensitivity is maintained even on the widest scale ranges. Red and green signal lights indicate temperature conditions and are visible over wide angles at distances up to 100 feet.

The calibration of the electronic pyrometer controllers is accurate to within $\frac{1}{4}$ of 1 percent of the scale range. This accuracy is maintained for long periods without adjustment. Temperature deviations from the control set point of as little as one degree for iron constantan or 1.5 degrees for chromel alumel thermocouples trip the control relay which starts corrective action.

Features include simplicity of design, sturdy and compact construction, ease of operation, simple installation and minimum maintenance since standard vacuum tubes are used in the electronic circuit. Vibration or mechanical shock will not affect the operation of this controller. **T-5-1281**

Press Air Valve

Hannifin Corp., 1120 South Kilbourn Ave., Chicago 24, announces a special air control valve which, the manufacturer asserts, makes practically impossible repeats due to valve failure on mechanical presses controlled by air-operated clutches and brakes. The valve, latest to be announced in the firm's P-M line of Pilot-Master valves, is a dual 3-way valve, two three-way valves in parallel in one compact, common body. Both valves must operate to start the press, but if for any reason only one valve reverses, the unit fails



safe and the press stops. The valve is called the P-M series BB-5 and is offered only in $\frac{3}{4}$ -inch ips. It is an adaptation of the firm's earlier series B-3 valve, announced last year for this same service, and like the B-3 it is capable of speeds in excess of 600 cycles per minute. This BB-5 valve cannot fail other than safe; that is other than so the press will stop, unless there is identical failure, both pilot sections or both main valves, on the same stroke of the press. Under the law of probabilities, this would not happen in many, many millions of press cycles.

The two solenoids in this dual valve are connected in parallel in the electric circuit of the press. The two pilot sections are interlocked pneumatically so that, if either solenoid fails to operate, the valve will not build up enough pilot pressure to operate either main valve and the press will not start. On the other hand, with the press moving, if either solenoid or either pilot valve reverses, pilot pressure will fall so low on both sides that both main valves will reverse and the press will stop. The most unlikely situation, in which one or the other of the main valve sticks in the on position, simply results in a howl of escaping air, since both exhaust ports carry away not only the incoming air through the stuck valve, but the air in the press clutch and brake mechanism, thereby stopping the press. Thus, the valve both fails safe and acts as its own trouble signal.

In normal operation, both main valves operate simultaneously, and reverse simultaneously. Their combined capacity, and the internal passage which connects

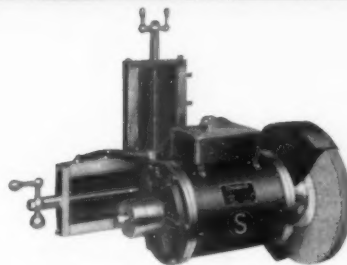
the two valves, give this valve on actual flow tests more than half again more air capacity than a single full flow valve of the same $\frac{3}{4}$ inch ips. This ability to fill and exhaust press clutches and brakes quicker speeds production.

Construction of the BB-5 valve employs Pilot-Master parts. Each main valve consists of a removable cartridge which contains the piston-poppet assembly, only moving part of the main valve. These piston-poppets are pressure actuated in both directions. Each pilot valve section has the pressure return type pilot stem. This stem, in effect a small piston, opposes the action

of the solenoid and provides positive reversal of the pilot valve the instant the solenoid is de-energized. The two solenoids are short stroke, low-amperage, continuously rated, with transformer-type silicon iron plungers and frames. Hardened tool steel is welded across the entire plunger face so the laminations cannot spread and cause the plunger to jam. The solenoids can be completely disassembled, and coils for 115, 230, or 460 volts and for either 25 or 50/60 cycles are all available as standard. Other solenoids, including dc, are available at extra cost.

T-5-1291

it's STANDARD for Motorized Spindles



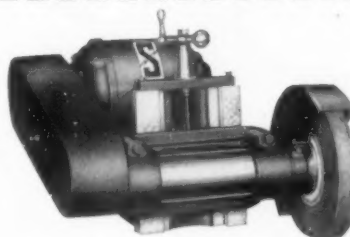
Angle Plate Grinder with horizontal and vertical feeds. $\frac{1}{4}$ to 10 H.P.



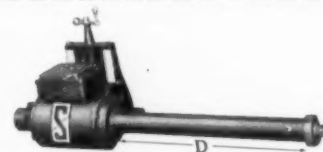
Vertical Spindle Grinder with or without feeds. $\frac{1}{2}$ H.P. to 50 H.P.



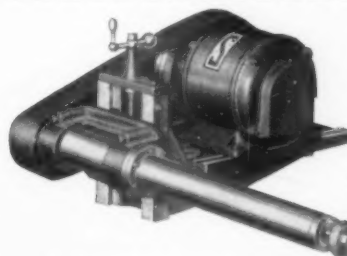
"A" dimension to order up to 16". For Planer, Boring Mill, Surface Grinder, Milling Machine.



Belt Driven Lathe Grinder. $\frac{1}{4}$ H.P. to 20 H.P.

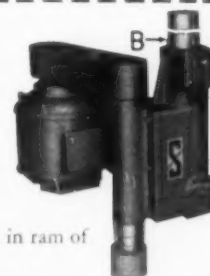


Internal Grinder, direct motor drive. Grind up to 30" deep. $\frac{1}{2}$ to 5 H.P.



Belt Driven Internal Grinder. Grind up to 24" deep. $\frac{1}{4}$ to 5 H.P.

Vertical Spindle Grinder, belted motor drive, $\frac{1}{2}$ to 5 H.P.



B = Adapter to fit in ram of Boring Mill.

Write for Catalog 44

THE STANDARD ELECTRICAL TOOL CO.
CINCINNATI 4, OHIO

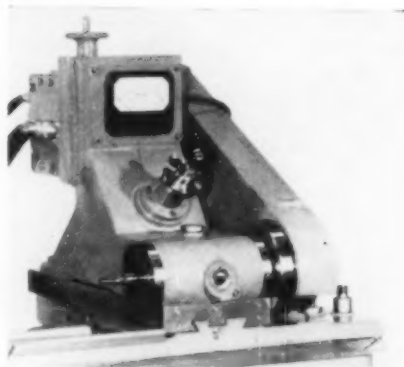
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-129

Hydraulic Thread Miller

This hydraulic group of thread milling machines is offered in four sizes: 4 x 9 inches, 10 x 24 inches, 15 x 30 inches, and 20 x 48 inches, with bed lengths to meet customer requirements.

Outstanding features are as follows: speeds are infinitely variable up to 3000 rpm. The application of adjustable speed hydraulic motors to the cutter spindle drive and the work spindle drive permits a balancing of cutter speed and work feed, thus producing the best cutting condition for the material involved and permitting the use of carbide cutters where applicable. Adjustments are instantly possible during the operating cycle so that no time is wasted in finding the best spindle rpm during setup.

Hydraulic power developed from an



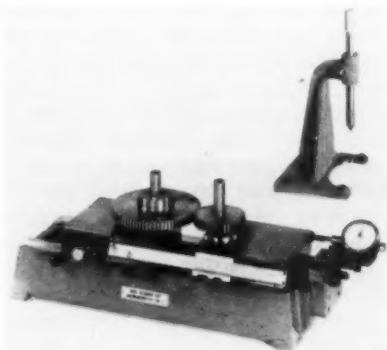
independent pressure plant is also applied to other actions needed on the machine, such as work chucking and carriage movement. Feeds are from 6 seconds to 1 minute per revolution; rapid traverse time is approximately 4 seconds. Operating cycles can be

speeded to 10 times per minute. Speeds and feeds are variable without changing gears. All actions are automatic except handling of workpieces. The hydraulic head absorbs and distributes the vibration of heavy cuts at high speeds and still generates smoothly finished threads, well within class-of-fit tolerances.

For further information, write to Hanson-Whitney, Bartholomew Ave., Hartford, Conn. **T-5-1301**

Spur Gear Tester

The base of the spur gear tester is a flame hardened mechanite casting insuring complete stability. Floating head rests upon precision steel balls for extreme sensitivity. The floating head contacts a dial gage reading in 0.0005 inch. The slide is held against the gage by means of a spring which is adjustable to the desired pressure. For measuring center distance a rustproof scale and vernier is furnished reading in 0.001 inch. For quick and easy visibility the scale has the new Lustro-Chrome finish. The slides are drilled and tapped for the mounting of vertical center supports for the inspection of pinion gears. One support is furnished as standard equipment.



The gears to be tested are placed on fixed arbors, or studs, thus avoiding rotating shafts which might introduce errors. The readings obtained on the dial, therefore, are the actual test of the gears. By spinning the two gears, the inspector can quickly determine their running quality. Simple and easy to operate, the instrument will quickly reveal errors in center distance, eccentricity, spacing errors, the presence of burrs, and the backlash of the gear can be estimated.

Made by George Scherr Co., Inc., 200 Lafayette St., New York 12.

T-5-1302

USE READER SERVICE CARD ON PAGE 139 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

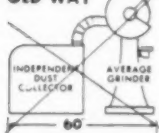
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of KALAMAZOO

2 IN 1
NO-DUST
GRINDER



SAVE OVER 50% FLOOR SPACE
THE HAMMOND WAY

OLD WAY



DUST-LADEN AIR IS A MENACE!

- Protect your employees' health.
- Protect nearby machine tools from dust and grit.
- Save floor space — requires only 6½ square feet. For 10", 12", and 14" wheels. Write for Catalog.

Hammond Machinery Builders INC.

1661 DOUGLAS AVENUE • KALAMAZOO 54, MICHIGAN

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Comparator

An air gage called the Air-O-Limit model G comparator has been developed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn. Features of the new gage include its high magnification, a new larger gage dial and the use of long wearing standard gaging plugs.



Magnification is obtained by the use of an amplifying unit in conjunction with an adjustable restriction and large indicating dial. The unit is furnished with either one of two magnifications, 10,000 X (full scale equals 0.0008 inch, each division equals ten millionths) or 5,000 X (full scale equals 0.0016 inch, each division equals twenty millionths).

A larger dial, five inches in diameter with linear graduations increased to 180 degrees and arc length increased to eight inches, is used on the model G Air-O-Limit comparator for greater ease in reading. The swivel mounted and easily positioned meter is the high speed type with the Bourdon tube liquid-filled for high speed, dead beat action.

Closer tolerance gaging plugs are not necessary in order to obtain the high magnification. Standard plugs having a comparatively large diametrical clearance or nozzle drop such as used with other Air-O-Limit models are used. Thus, the instrument permits operation at high magnification with gaging plugs that will produce comparatively long wearlife.

Hand gage attachments, both straight type and L type, are available for those gaging operations where greater convenience may be obtained by bringing the gaging plug to the work.

Other features of the comparator include a Jacobs chuck plug adapter, adjustable restriction unit, mullmatic regulator and a self contained stand.

T-5-1311

USE READER SERVICE CARD ON PAGE 139 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

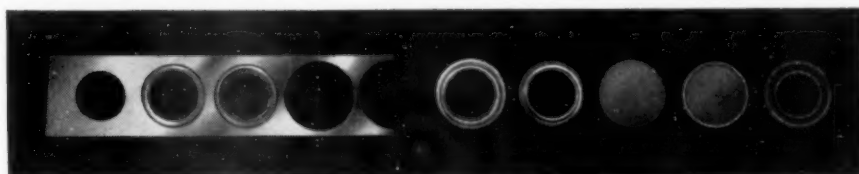
HERE'S ONE SECRET OF AMERICA'S PRODUCTION

Might!



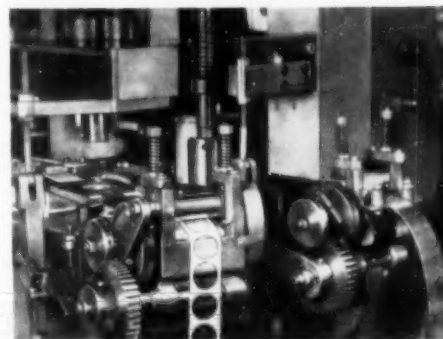
Progressive Dies Production Proved by B. Jahn! Fluid drive couplings . . . carbine magazines . . . thousands of production components are being produced in tremendous numbers . . . at reduced cost . . . in less time from B. Jahn dies. This ball bearing seal is a typical example of B. Jahn versatility and ingenuity at work.

PROBLEM: Build progressive dies combined with dial operation to produce a series of intricate ball bearing seals. Seals consisted of a formed metal ring and neoprene insert assembled into a single unit. All assemblies had to be identical, meet micro-tolerant specifications.



Die ribbon showing stations necessary to produce each seal.

SOLUTION: B. JAHN PROGRESSIVE DIES Production Proved to turn out 50 complete units per minute! All seals were identical — all were perfect. Tools were so designed that with a 3 hour set-up time for each, 9 different sized seals could be produced in the same press equipment.

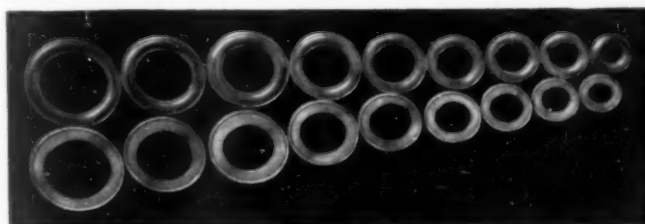


Ball bearing die during pre-test run on customers' equipment. First step of exhaustive tests before die is certified "PRODUCTION PROVED."

50,000 ball bearing seals were run for customer's actual assembly line use. Here guesswork, error, costly adjustments were eliminated — here was visual evidence that the die must work in the customer's equipment to his unqualified satisfaction before it was certified "PRODUCTION PROVED" and shipped.

YOURS —

Full details on the output-increasing applications of B. Jahn Production Proved Dies — send for this fact-filled B. Jahn brochure TODAY!



Top and bottom views of nine different seal assemblies.

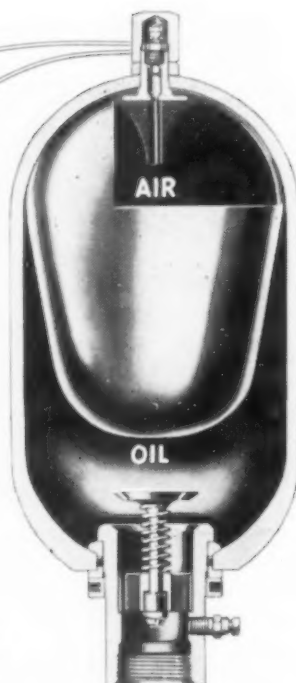
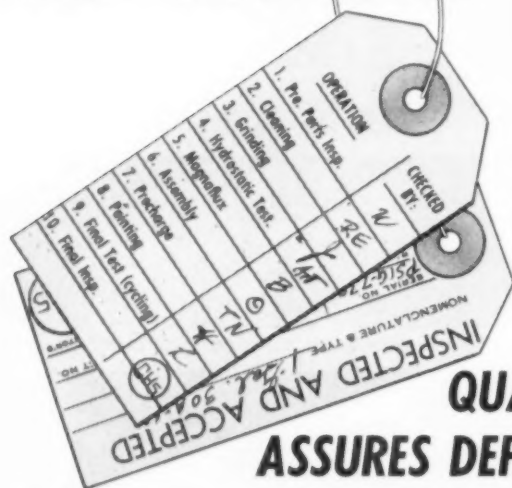
Investigate B. Jahn — Invest in Production Economy!

B. Jahn

THE B. JAHN MANUFACTURING COMPANY, NEW BRITAIN, CONNECTICUT

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Checked and Double-checked 10 WAYS



QUALITY CONTROL ASSURES DEPENDABILITY of GREER ACCUMULATORS

Functions Performed by GREER ACCUMULATORS

1. **PRESSURE STORAGE CHAMBER** to provide
 - a. Main source of hydraulic power.
 - b. Auxiliary power source.
 - c. Emergency power source.
2. **PRESSURE-VOLUME COMPENSATOR** for
 - a. Leakage compensation.
 - b. Temperature compensation.
3. **DISPENSER OF FLUIDS** and Lubricants.
4. **TRANSFER BARRIER** for Fluids and Gases.
5. **SHOCK ABSORBER** to
 - a. Absorb line shocks.
 - b. Reduce pump pulsations.

Hydraulic components seldom get such an exhaustive workout during manufacture as Greer Accumulators. At every step on the production line the accumulator parts are checked, double-checked, and signed for by an inspector before the next operator will touch them. Finally the accumulator is cycled as a unit under simulated operating conditions. The inspector who puts his final OK on the tag will bet his life that the accumulator will function properly.

If you want to know how Greer Accumulators can reduce the size, cost, and complexity of your equipment, write or phone.

SEND FOR BULLETIN



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Brooklyn 15, N. Y.

Sales Representatives in Principal Cities

District Offices: 407 So. Dearborn St., Chicago 5 • 2832 E. Grand Blvd., Detroit 11

Manufactured and distributed under license in Great Britain by Finney Presses Ltd., Berkeley St., Birmingham 1, England.

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Portable Surface Plate

The Ultra-Flat portable plate is designed to meet the needs of those who must have the utmost in accuracy and at the same time need the convenience of a plate that can be carried from place to place and job to job.



The plate is 8 x 12 x 2 1/2 inches, is of 4-lip design, and the over-all surface accuracy is twenty-five millionths of an inch.

The hardwood case is ruggedly built and can be furnished with a lock when desired. The plate and case together weigh a little more than twenty pounds.

This plate is available in either Velsay black or Velsay red granite and is fully covered by the Velsay 10-year warranty. The Elkro Co., 738 Albany St., Dayton 8, Ohio. **T-5-1321**

Turret Mill Drive

An adjustable speed drive on the Rogers perfect 36 vertical turret mill has been announced by the Rogers Machine Works, Buffalo, N. Y. This adjustable drive provides unlimited table chuck speeds up to 212 rpm. The power unit, which requires comparatively little floor space, governs motor speed and eliminates the eight-speed transmission, clutch, brake and lever controls on the standard perfect 36 vertical turret mills.

The independent speed control box may be located in the most convenient location for the operator. This control box, equipped with rheostat control, has start, stop and jog push buttons and sets, changes motor speeds and provides a ratio of more than 16 to 1. Speeds may be changed while the machine is in operation.

The motor provided with this adjustable speed drive is designed for adjustable service and may be started and stopped without changing the speed setting. Dynamic braking for quick stopping is controlled by the stop button. The drive may be modified to meet JIC specifications. **T-5-1322**

Surface Grinder

The DoAll model D6 toolroom grinder has been designed to receive attachments or incorporate additional components that greatly broaden the scope of surface grinder applications.



This surface grinder is obtainable with a longer table than is usual in toolroom surface grinders. The cooling system affords fingertip control for selection of one of three cooling methods. The Cool Grinding operation is no longer a gravity feed system where the used coolant is discarded. Because it is part of the common filtered, recirculating pressure system, the coolant is reused again and again. This versatility in coolant control is achieved through an ingenious manifolded wheel guard. Only a single hose connection is required between the reservoir-pump-filter unit and the guard.

Wheel guard design in the grinder emphasizes convenience. To remove a wheel, for example, it is not necessary to remove the guard cover. The front cover is hinged and can be raised out of the way. Further, the entire guard can be removed without removing the wheel from the spindle.

Another advantage of this arrangement is that the guard can be adjusted to any height with respect to the wheel. Thus, if greater wheel depth is required for grinding deep slots, for example, the guard can be raised to expose more of the wheel. The guard height adjustment screw is locked by means of a thumb screw.

The coolant tank, combination coolant pump and motor, plus filter, comprise one unit which rides on casters. Return coolant is subjected to a sequence of filtering and settling processes. Capacity of the coolant tank has been increased to 20 gallons.

Increasing the applicability of the surface grinder to special toolroom jobs is a high-speed spindle attachment. This attachment is essentially another spindle, belt driven from the grinder spindle. It affords the very high spindle

speeds required in using small diameter wheels. The small wheels are particularly suited for grinding serrations, T-slots and for many other intricate grinding tasks. The attachment mounts to the surface grinder spindle after the wheel guard and regular wheel have been removed. Interchangeable quill design of the high-speed spindle permits the mounting of wheels with arbor holes of various diameters.

Also provided, when specified, is a cylindrical grinding and indexing attachment for its toolroom grinder. It is readily used in conjunction with other attachments such as the high-speed spindle or it is used alone to grind cylinders, tapers, square or angular punches and many other forms. The cylindrical grinding attachment incorporates an integral two-way sine bar base adjustment which, when set with gage blocks, provides the ultimate in angular accuracy. It is furnished with a

24 division index plate but other indexing plates may be obtained.

The hydraulic cross-feed indexes automatically at both ends of the table stroke. When the lateral motion of the table is stopped, the cross-feed hydraulic mechanism can be used to move the saddle back and forth under the wheel. A simple control regulates its speed.

Slip rings mounted on the handwheels can be zeroed after an initial cut and thickness measurement of the work has been made. Then the required stock can be ground off from literal readings of the handwheel. The mathematics ordinarily involved in interpreting handwheel readings is eliminated as is the necessity for frequently removing the workpiece for measurement checks.

All operating levers of the new grinder have been redesigned. They are big and accessible. Made by the DoAll Co., Des Plaines, Ill. **T-5-1331**

5 tips serve every machine in your plant!

There is no need to stock all the various sizes of Morse, Browne & Sharpe, or Jarno taper centers when the INTOCO line of adapter shanks and 5 sizes of insert tips will do the job.

The INTOCO line of lathe and grinder centers is the result of extensive research and engineering. Centers are of two piece design, consisting of a shank and replaceable tip. INTOCO Center Tips are made in four different alloys to fit the many different applications that the modern shop is called upon to machine.

INTOCO Tips are ground to a fine tolerance and finish, and perfect concentricity is maintained between the O.D. of the shank and the center point.

Learn more about the INTOCO line and how it can increase shop production and save you time and money. Don't delay — write today for free 8 page catalog which gives complete specifications on INTOCO Standard and Gash Type Center Tips.

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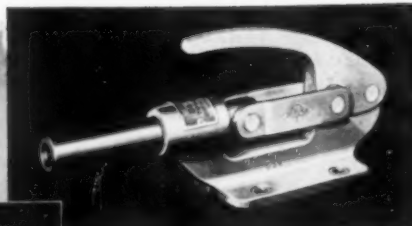
**Save
DOLLARS**



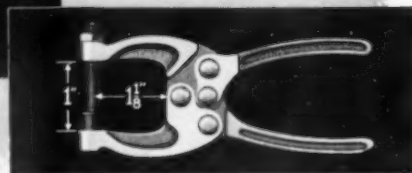
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**TOGGLE
CLAMPS**



**— SPEED
PRODUCTION**



De-Sta-Co Toggle Clamps are extremely flexible in their application and are economically and easily adapted to work-holding fixtures for assembly, welding, bonding, machining or other production processes. Smooth, fast, powerful clamping action clamps parts quickly . . . holds them firmly in perfect alignment . . . releases instantly for easy removal and insertion of new workpiece.

De-Sta-Co clamps are engineered for rugged use in production; reamed bearing holes insure precision fit, long life and sensitive operation . . . offsets in handles and links relieve friction . . . made with cold drawn bars, and forged portable clamp parts. Accessories for adapting clamps to specific applications are available.

Write today for name of nearest distributor and your copy of the De-Sta-Co catalog which describes over 40 fixture and portable models with positive holding pressures up to 4000 pounds.



328 MIDLAND AVE. • DETROIT 3, MICH.

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"Pete isn't crazy, Doc! He just made a new production record on the hot work job with FIREDIE."

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels—High Speed Steels
Die Steels—Hot Work and Shock Resisting Steels
Carbon Tool Steels.



Feed Mount Adapter

An adjustable feed mounting adapter is announced by the H. E. Dickerman Mfg. Co., Springfield, Mass., designed for use with its several models of die feeds and the Rol-Di-Feed. This adjustable feed mounting adapter permits quick and simple adjustment of the stock line of the feed with the stock line



of the die and also alignment of the feed with the set edge of the die, thus eliminating the necessity for using shims, in addition to reducing setup time. The device consists of a mounting base and a feed mounting member which is already drilled and tapped to accommodate all sizes of feeds. Vertical adjustment is attained through use of the built-in screw jack, and slotted screw holes in the mounting base, which is attached to the bolster plate of the press, permit horizontal adjustment.

T-5-1341

Boring Machine

A machine to handle complicated, irregular profile milling and boring of aluminum, magnesium castings and forgings, cast and rolled armor plate has been developed by Forney's Inc., New Castle, Pa.

The new boring and facing machine is equipped with duplicator equipment with templates. It is applicable to difficult profile machining necessary in the manufacture of aircraft and armored vehicle parts.

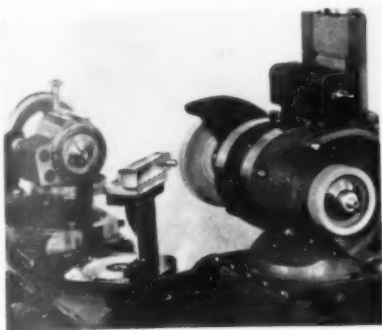
According to the company, the machine is a complete package ready to be placed in service when it leaves the factory. The package may include work holding fixtures, tooling, templates and floor plates as required by the user.

The machine features a spindle housing as a motor-powered unit which moves directly into the workface. It is said this makes work more accurate and gives more power and rigidity to the cutting tool.

T-5-1342

Angle Dresser

An inexpensive wheel dresser for dressing angles on grinding wheels is announced by Royal Oak Tool & Machine Co., 29800 Stephenson Highway, Royal Oak, Mich. The dresser has a graduated base and five-minute vernier to permit precision setup and dressing.



The diamond tool is mounted in a hardened steel block and dressing is accomplished by sliding the block across the hardened ground surface of the dresser plate. The dresser plate can be set to any desired angle and the inverted T-slide permits dressing the wheel on either side.

While specifically designed for use on the D-S bench model radial relief grinder, it can also be used on practically all other cutter grinds and toolroom OD grinders. **T-5-1351**

Protective Wrap

Spot-seal, a protective wrap for wrapping metal parts, has been announced by Sherman Paper Products Corp., 16600 Oak St., Newton Upper Falls, Mass. It is a specially coated wrap that sticks only to itself. Simply wrap it over the parts, press it together, and the package is sealed, the maker claims.

Spot-Seal makes a tight, dust-proof, water-repellent, tamper-proof wrap that keeps out dirt and foreign matter, and protects finely finished metal surfaces from scratches, abrasion and finger-prints. It is the ideal wrap for small subassemblies, replacement kits or other small units. The loose parts can be wrapped together—easy to store and ship, with no loss or damage to small parts.

Since Spot-Seal sticks only to itself, it cannot damage metal surfaces. It is quicker to use, requires no fastenings to seal it. Wrapped parts are easy to identify and can carry the code number marked on the package. It is adaptable to either manual or mechanical production packaging, and is available in rolls, printed or plain, 600 lineal feet long and in usual widths from 12 to 48 inches. **T-5-1352**

When Worn



THROW THEM AWAY
... and Save Money



Regrinding of carbide tools—even the best—consumes time and money. It can be a major item in over-all tooling costs. But—there's a way to eliminate this expense entirely on many jobs. Here's how.

The "Kendex" tool needs no regrinding! It has an indexable insert that can be discarded when all its multiple cutting edges become dull.

By the time replacement is required (at slight cost compared to that of regrinds), the insert has already paid for itself by increased productivity, and to discard it is economical practice.

Kendex tools are available in three styles—with round, square, or triangular inserts—as illustrated, and in a range of shank sizes— $\frac{1}{2}$ " to 1" square.

Perhaps you have jobs on which standard Kendex tools will be suitable—or you may be able to use the standard inserts in conjunction with present tooling. If you desire, one of our Tool Engineers will be glad to assist in working out suitable applications of the "Kendex"* principle to your specific machining problems. Kennametal Inc., Latrobe, Pa.

*KENDEX®

KENNAMETAL
CEMENTED CARBIDE TOOLING
THAT INCREASES PRODUCTIVITY



VITAL NEWS FOR USERS OF OLD SCREW MACHINES

Lipe Automatic Magazine- Loading Bar Feeds boost output 30% and more on 15 to 30-year old B&S's!

Lipe's AML Bar Feed greatly speeds-up stock feeding. Enables a screw machine to produce 90% or more of its gross geared production capacity. Increases output at least 30%—in many instances better than 100%!

Makes feed fingers obsolete

Lipe's AML Bar Feed is actuated by a pneumatic control system of valves and cylinders. Stock is fed through the collet by a pusher rod at the end of the bar. There is no other point of contact. This method of feeding does away with feed fingers . . . abolishes multiple feed finger feedouts . . . eliminates scratching and marring of high-finish stock . . . reduces scrap and rejects.

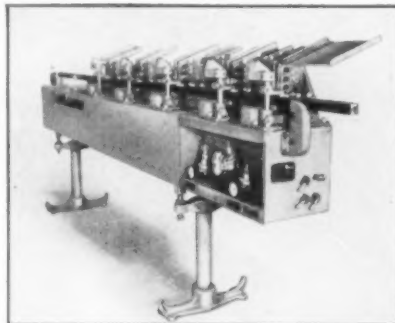
Load it . . . forget it

Magazine holds a normal 8-hour day run of stock. Capacity ranges from 19— $\frac{5}{8}$ " to 96— $\frac{1}{4}$ " bars. Loading and feeding are automatic. Stock is fed continuously . . . there's no idle operation—no "cutting air." Operators are relieved of repetitious stock bar handling . . . can attend a greater number of machines.

Convert your old screw machines into modern, high-production equipment . . . economically! Let our engineers show you how. No obligation. Write **Lipe-Rollway Corporation, Syracuse 1, N.Y.**



This battery of 25-year old screw machines received a production "shot in the arm" when equipped with Lipe AML Bar Feeds.



Lipe AML Bar Feeds help overcome new equipment shortages . . . cut cycle time, increase actual gross of older machines.

MODEL AML BAR FEEDS AVAILABLE FOR...

B&S No. 00 Spindle Bore $\frac{5}{16}$ "

B&S No. 00 Spindle Bore $\frac{11}{16}$ "

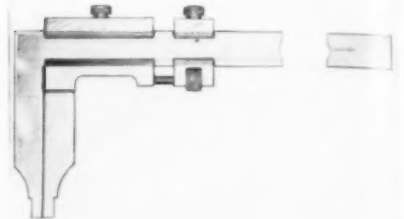
B&S No. 0 Spindle Bore $\frac{7}{8}$ "

B&S No. 0 Spindle Bore 1"

Other Lipe Pneumatic Bar Feeds available for other screw machines, automatic or hand, handling from $\frac{1}{8}$ " to 2 $\frac{1}{2}$ " diameters.

Calipers

Vernier slide calipers from Schweizer, a large caliper maker in the U. S. Zone of Germany, are now available in this country in sizes from 10 to 46 inches. Of hardened chrome steel, with sharp, accurate machine-divided graduation, these provide precision readings



or settings in English measure to 0.001 inch. Jaws are hardened, ground and lapped, and vernier slides are fitted tightly and smoothly. A fine wooden case is provided. Also available are similarly precision-made vernier height gages in sizes from 12 to 48 inches. For further information address Glogau & Co., Inc., Dept. V, 1914 Birchwood Ave., Chicago 26. **T-5-1361**

Phosphatizing Material

Oakite CrysCoat HC is a phosphatizing material which creates a complex zinc phosphate coating on steel and iron. It provides a coating which is crystalline in nature and has a weight ranging from 200 to 1000 milligrams per square foot, depending upon how it is applied and the type of steel being treated. It may be used in tanks and in pressure spray washing machines.

CrysCoat HC comes in liquid form and is furnished in 12-gallon glass carboys of 170 pounds net. When added to water it goes into solution immediately. A feature of this product is that sludging and scaling are reduced to a minimum. After a while, a very light sludge develops into a light scale chiefly on the steam coils. The scale is easily removed when the tank is to be recharged. Another advantage of CrysCoat HC is that an all stainless steel setup is not necessary. The tank may be of stainless steel if available, but mild steel is satisfactory. Steam coils, however, should be acid-resistant material. In washing machines, the nozzles, risers and the pump impeller should be of acid resistant material.

A third feature of CrysCoat HC is the simplicity of its use. Only one material is involved. The only upkeep required is the material itself. There are no special additives or toners needed. The amount of upkeep required is determined by a titration procedure, the equipment for which is provided free.

For further information, write to Oakite Products, Inc., 19 Rector St., New York 6. **T-5-1362**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-136

Dynatomic Grinder

The Dynatomic grinder is designed for grinding cemented carbide tools without the use of diamond wheels. According to the manufacturer, it grinds 10 to 20 times faster and produces a superfinish, as well as rough and finish grinding at the same time.

The grinder is based on the Dynatomic theory of metal-cutting. According to this theory, the release of nascent atoms of nitrogen, chlorine, hydrogen and oxygen from the molecular decomposition of the Dynatomic grinding fluid reduces the generation of heat



to a small fraction of normal. The mere chemical presence of the fluid on the wheel suffices, it is said. To insure this, the fluid is pumped through the spindle and wheel. An auxiliary jet on the wheel face scrubs away loose abrasive and carbide. An extremely high wheel speed provides a high energy value to the abrasive particles, resulting in rapid material removal.

The wheels used in this process are a semisegmental form. The Dynatomic fluid is a synthetic material, a derivative of Metalloid, is chemically inert, and the original supply never has to be changed.

Setups on the Dynatomic grinder for grinding various types of tools are similar to conventional practice. The tool should be moved back and forth across the wheel face constantly to maintain a straight face and minimize heat concentration. Stock removal is extremely rapid. According to the company, stock removal is at the rate of over $\frac{1}{8}$ inch of carbide from a tool surface $\frac{3}{8} \times \frac{5}{8}$ inch in one minute. The resulting finish is in the neighborhood of five microinches rms. The linear wheel wear is about 0.001 inch for every 0.012 inch of stock removed, it is claimed.

The grinder comes in two models, plain and universal. On the plain grinder a tilting table with cross ad-

justment is mounted on top of the knee in front of the wheel face. The grinding is thus offhand, the tilting table being set at the desired tool angle to be ground. The universal machine for cutter, reamer and drill grinding includes in addition a saddle-table unit which sets on top of the knee. The saddle provides for cross adjustment on hardened and ground steel ways through a lead screw and micrometer dial handwheel.

For further information, write the Dynatomic Corp., 7 South Dearborn St., Chicago 3.

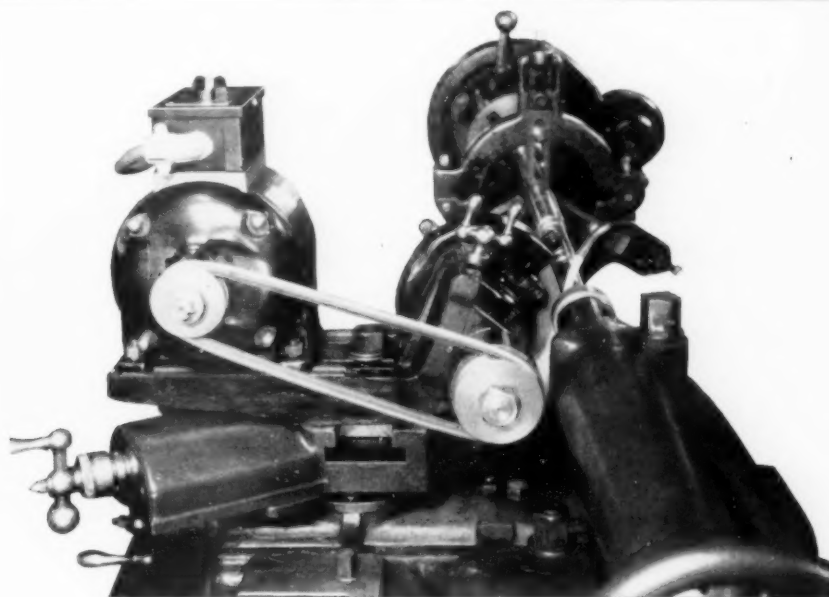
T-5-1371

Sheet Handler

Introduction of a sheet and strip handling machine that can support long narrow strips as they are cut by the shear has been announced by the Fried Steel Equipment Mfg. Corp., 528 East 119th St., New York 35.

Called the Coilveyor, it can handle strips up to six feet long and from 20 to 48 inches wide. After the ribbon comes off the coil it passes through the leveler and is then cut by the shear. Air operated plungers of the Coilveyor support the ribbon during the cutting operation.

L-5-1372



$$L + 4KX = ?$$

The symbols in the above equation represent your Lathe and a "HISEY" type 4KX Precision Grinding Head. The answer is truly a precision grinder.

Illustration at left shows the 4KX 1 H. P. Grinder with external grinding head mounted, including 10-inch diameter wheel.

The special internal spindles are interchangeable with the external spindle, permitting a wide range of external, internal and surface grinding operations.

"HISEY" Precision Grinders are furnished from $\frac{1}{4}$ to 10 H. P. capacity. The V-belt drive affords the most efficient and economical speed; permits rapid speed changes as required.

They can be mounted on a boring mill, planer and other machine tools for production or tool room work.

Write for catalog 72 EF today!



FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-137

"Just like a grinding wheel!"



Grinding Wheels

He's right! A grinding wheel's cutting particles *are* embedded like currants in a bun. But there's more than that to Simonds wheels. The cutting particles are scientifically processed by Simonds. They're accurately sized. They're evenly distributed. Their spacing in the wheel bond is controlled for maximum cutting efficiency on specific grinding jobs. This controlled quality assures *you* of superior performance each time *you* order Simonds grinding wheels, mounted wheels, segments or polishing grain. Write for data book and name of your distributor.



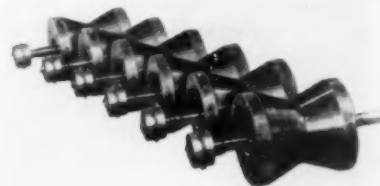
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Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co. Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-138

Permanent Magnetic Rolls

Non-electric concave and straight magnetic rolls with extremely high surface strength are designed to cut time and labor costs of handling pipe, rods, angles, flat sheets, plates, bars, etc. The rolls use no current, require



no wiring and only a minimum maintenance. Their magnetic strength is certified, guaranteed permanent for the life of the unit.

Rolls for conveying pipe, rods, angles, etc., are concave in shape to keep pipe material centrally located. Rolls for handling flat material are straight faced. Dings Magnetic Separator Co., 4740 Electric Ave., Milwaukee, Wis.

T-5-1381

G-Bond

Norton Co., Worcester 6, Mass., announces a new vitrified bond for their grinding wheels.

Named G-Bond, and identified by the symbols VG in the marking, field tests reveal good performance for cylindrical, centerless, surface, internal, gear, tool and cutter, form and thread grinding, and saw gumming.

G-Bond's ability to make a grinding wheel act much better is due basically to the way the abrasive grains are held by the bond until they have accomplished their cutting job, and are then released to make room for new grains with fresh, sharp-cutting edges. It is this ability of G-Bond to hold the grains just long enough that keeps the wheel's grinding surface at peak efficiency.

The bond can be used in conjunction with many types of abrasive, including: 32 and 38 Alumdum abrasive, regular Alumdum abrasive, 19 and 57 Alumdum abrasive.

G-Bond's advantages are seven: can do more work per wheel; cut cooler, freer and faster than wheels with other bonds; more pieces per dressing and easier to dress; cover a wider range of jobs; hold shape, therefore well-suited for form grinding; hold corners better; and ideal for crush dressing. T-5-1382

USE READER SERVICE CARD ON PAGE 139 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION

THE TOOL ENGINEER'S *Service Bureau*

TRADE LITERATURE CURRENTLY OFFERED BY THE TOOL ENGINEER ADVERTISERS

LITERATURE NUMBER	COMPANY	BULLETIN	DESCRIPTION
A-5-250	Allegheny Ludlum Steel Corp.		36-page booklet, "Cutting Tool Materials" discusses cutting problems.
A-5-203	American Branch & Machine Co.	309	Balanced production, simple loading, automatic clamping explained in American's Circular.
A-5-232	American Drill Bushing Co.		Now, free catalog reveals secrets of saving time and money.
A-5-128	B. C. Ames Co.	55	Ames' catalog suggests a solution of your quality control problems.
A-5-151	Armour & Co.		Free booklet "Backstand Belt Polishing" gives complete story of money-saving backstand belt method.
A-5-30	Beaver Tool & Engineering Corp.	53	Cost-reducing Beaver Tools offer many advantages. Described in catalog.
A-5-184-2	Beaver Tool Co.		Free folder offers information on eliminating special length drills.
A-5-246	The Bellows Co.	CL-50	Bulletin tells how air-cylinders combine built-in hydraulic, electric and speed controls.
A-5-176-3	Black Drill Co.		"Hardsteel" Operator's Manual tells how to save time and reduce rejects.
A-5-171	Brush Electronics Co.	F-618	Bulletin relates method of simplifying the solution of many electrical and mechanical test problems with Brush instruments.
A-5-265	Cadillac Stamp Co.	H-120 H-120	Cadillac marking devices designed for all marking needs explained in bulletins.
A-5-27	The Cincinnati Shaper Co.	B-4	72-page press brake catalog tells how to save three ways.
A-5-159	The Cleveland Cap Screw Co.		Place Bolt Folder suggests solution of vibration-point fastener problems.
A-5-173	The Cleveland Tapping Machine Co.	TL-54	Improved core drilling, reaming, tapping, threading, chamfering all explained in catalog.
A-5-224-1	Comstar Co.	66	Bulletin explains advantages of "Packaged Precision."
A-5-226	Crane Packing Co.		Additional data on complete line of Lapmasters available on request.
A-5-160	Darwin & Milner, Inc.		Free bulletin gives suggestions which will result in better performance—greater economy.
A-5-222	Davis Boring Tool Division, Giddings & Lewis Machine Tool Co.	603	Details on Davis single cutter micrometer adjustable blocks given in bulletin.
A-5-149	Delta Drill Unit Division, Rockwell Mfg. Co.		Three Delta air-powered hydraulic drill unit models now available to meet specific requirements.
A-5-193	Eastman Kodak Co.		New 12-page booklet tells how to help reduce inspection costs and improve quality.
A-5-290-1	Eutectic Welding Alloys Corp.		Free Tool and Die Salvage Welding Manual lists quick, easy ways to save time, labor and money.
A-5-234-1	M. A. Ford Mfg. Co., Inc.	397	Complete details and operating data on Ford regrinding service offered in catalogue.
A-5-166	Fray Machine Tool Co.	10	Bulletin offers hints on speeding production at low cost.
A-5-155	The Gairing Tool Co.		E-Con-O-Mill Catalog tells how to save on inventory, grinding and waiting for delivery.
A-5-170	Gorham Tool Co.		Free 120-page catalog offers profitable solutions to milling problems.
A-5-272-3	Grobet File Company of America, Inc.	HCI	Staggered cutting edges scientifically designed to eliminate chatter.
A-5-130	Hammond Machinery Builders, Inc.		Built-in Duskolator saves floor space. See catalog.
A-5-211	Hannafin Corp.	10106 210 57W 231	Bulletins offer many valuable suggestions on Hannafin's complete line of air control equipment.
A-5-220-1	Hapman Conveyors, Inc.	TE-565	Bulletin explains ways of effecting worthwhile savings.
A-5-5	Hardinge Brothers, Inc.	8	Complete information on company's checks and collets given in bulletin.

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A-5-10	Haynes Stellite Co., Division Union Carbide & Carbon Co.		Booklet "Haynes Stellite Metal-Cutting Tools" gives helpful information on the use of their tools.
A-5-137	The Hisey-Wolf Machine Co.	7227	Efficiency, economy, speed offered in use of "Hisey" Precision Grinders.
A-5-151	The B. Jahn Mfg. Co.		New fact-filled brochure gives full details on increase of output with Jahn dies.
A-5-272-1	J. G. Jergens Co.	TE-5	Pilot bearing bushing seals against coolant and grit.
A-5-53	Kling Brothers Engineering Works	347	Bulletin offers complete details, capacities, technical data and specifications on Kling combination shear-punch-sawer.
A-5-31	The Lapointe Machine Tool Co.	5	Broaching applications of current interest fully described in portfolio.
A-5-282	Lindberg Engineering Co.	1440	Bulletin describes points of design and construction to minimize costly breakdowns and work stoppages.
A-5-254	Lodding, Inc.		Catalog contains full scale layouts of fixture details and clamp assemblies.
A-5-210	Metal Carbides Corp.	CR-50	Blanking die life increased; plating costs reduced with Talldie Rolls.
A-5-176-2	W. F. Mayers Co., Inc.	13	More holes, more accuracy, more speed, less cost. Information in catalog.
A-5-238	The National Acme Co.	DT-52	Catalog tells how to avoid adjustments, and scrap loss and save time.
A-5-172	Nelco Tool Co., Inc.		For that extra EDGE in production, refer to catalog.
A-5-144-2	Nilsson Gage Co., Inc.	D.E.M.	Catalog offers suggestions on methods of time saving, and scrap reduction.
A-5-85	Norton Co.	531	Making better products to make other products better explained in catalog.
A-5-237	The Ohio Knife Co.		Knives ground to close tolerances to reduce manufacturing and assembly time.
A-5-277	The OK Tool Co.	13	"Modern Milling Cutters for Modern Milling Machines" catalog on request.
A-5-267	Ortman-Miller Machine Co.		More power packed into less space with interlocking mechanism.
A-5-11	Pope Machinery Corp.	52A	More production, better surface finishes, tolerances in the millionths.
A-5-276	R and L Tools, Inc.		Specially designed and precision made. New R and L catalog.
A-5-201	Reynolds Metals Co.		Free catalog "Reynolds Aluminum Cast Plate and Bar for Machining Shops, Foundries and Pattern Shops."
A-5-143	The S-P Mfg. Corp.	103	Long life—low down time with S-P air cylinders.
A-5-129	The Standard Electrical Tool Co.	44	It's STANDARD for Motorized Spindles.
A-5-4	Standard Gage Co., Inc.	C	Catalog gives information on how to do the job better, easier.
A-5-16	The L. S. Starrett Co.		Dial Indicator Catalog describes and illustrates complete line with specifications and useful data.
A-5-181	Sundstrand Machine Tool Co.	731	Free data available on Rotary Rigidmills in bulletin.
A-5-184-1	Swanson Tool & Machine Products, Inc.	V-4	Substantial savings in space, man-hours, tool investment described in bulletin.
A-5-278	U. S. Tool Co., Inc.	15-M	Bulletin gives complete specifications for four sizes of U. S. Multi-Slides.
A-5-245	Vanadium-Alloys Steel Co.		Free copy of "High Speed Steels" gives helpful and complete grades, applications and heat treatment.
A-5-147	Vitor Engineering Co.	53	Vitor Toggle Pads make your clamps and jacks safer described in catalog.
A-5-259	Waldee-Machinor, Inc.		New 12-page catalog gives mechanical details, cutting data, extra features, full information.
A-5-115-1	Zagar Tool, Inc.	E-5	Zagar Manual tells about Zagar holding and indexing fixtures for milling, drilling, tapping and grinding.

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Wet Blasting Machine

The addition of a new model to its line of wet blasting machines is announced by American Wheelabrator & Equipment Corp., 1182 S. Byrkit St., Ellettsville, Indiana.

Known as the model 30 Liquamatte, it is intended for precision cleaning and finishing applications involving small pieces that can be lifted and handled manually. Some typical applications are in the manufacture and maintenance of small stamping dies, die-casting dies, and drawing dies; in the manufacture and maintenance of glass, plastic, and the smaller rubber molds; the reconditioning of valves, pistons, rods, etc.; reconditioning



plant equipment such as oil burners; surfacing tools, such as drills, reamers, and taps before and after plating; cleaning oxides from tungsten carbide tips before brazing them to cutting tools; blending different types of finishes on aluminum; removing heat treat scale; deburring; cleaning out recesses in embossing punches and knurled pressing rollers; and cleaning for general inspection.

This machine has a blasting compartment 30 inches square and 2 feet 7 inches high. It has one vertical sliding door. A 15-inch diameter rotating work table is available for holding the work in the blasting compartment, and small portable auxiliary tanks are available to receive the parts from the blast chamber for rinsing.

The model 30 Liquamatte has one set of armholes on the front of the cabinet. The operator stands outside the cabinet, with his arms extended through gauntlets, and manipulates the abrasive gun toward the work with his hands while operating the compressed

air valve with his knee. When blasting is finished, the work is rinsed in a two-compartment auxiliary tank. Ferrous parts are rinsed in inhibited water. Immersion heater units are available for the water, so that parts dry faster and there is less chance for oxidation.

Among the special features of this machine are push-button controls. All of them are located on one central control panel convenient to the work station. To start the Liquamatte, the operator merely turns on the light and pushes two other starting buttons. There are no valves to open or close in either starting or stopping.

Another feature is the vertical pump for slurry agitation and recirculation. It is adaptable to rugged service, and because of its position, it eliminates all suction piping, valves, fittings, and labor for removing them for inspection of the pump.

T-5-1411

Welding Helmets

American Optical Co. announces a new line of one-piece compression molded plastic welding helmets. The No. 700 series helmet shell is made of thermosetting Fiberglas reinforced with Polyester resin. It possesses many advantages over materials generally used in welding helmets.

Its seamless construction makes this helmet exceptionally strong and the Fiberglas material is moisture-proof and resistant to high heat. It will not warp and is lighter than vulcanized fiber. Tests indicate superior wear and performance. It has a perfectly smooth surface which can be easily cleaned or sterilized.

No. 3 headgear is standard equipment on the No. 700 series Fiberglas helmets and is made from an entirely new plastic that will not absorb moisture. It conforms readily to any shape head to provide maximum wearing comfort and can be cleaned in antiseptic solution or soap and water. Its free-floating joint suspension is an integral part with a ratchet-type headgear adjustment. Also standard equipment is a new S-type four-position adjustable helmet stop with a steel spring engaging a pin, providing a sturdy, but simple adjustment for quick selection to fit individual needs.

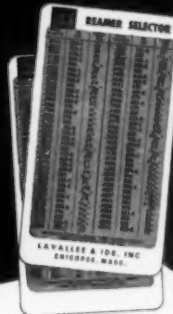
Four completely insulated glass holders, light in weight but with exceptional impact resistance, are available: No. 1130 plastic stationary; No. 1136 plastic lift-front; No. 1085 insulated steel or No. 1096 insulated Dow-metal lift front.

Filter and cover lenses are easily and quickly inserted and held securely in a holder which "flexes" slightly to prevent breakage.

T-5-1412

THERE'S NO DOUBT ABOUT L&I REAMERS

It's easy to choose the right reamer with the NEW Reamer Selector



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INDICATE A-5-141

Height Gage

The Airetest indicator for the precise measurement of critical dimensions normally encountered in toolroom work is announced by The Sheffield Corp., of Dayton 1, Ohio. This simple, rugged, quick and easy to calibrate super-sensitive air height gage has adequate amplification, and gives positive repeat readings when approached from the front, back or either side. The indicator may be located in a place most convenient to the operator and regardless of the position of the gaging stylus. The instrument is free from hysteresis and a movement of a few millionths is instantly indicated. It cannot stick.

The Airetest consists of a pickup arm mounted on a beam actuating an air jet connected to a 1000-1 or 2000-1 amplification Precisionaire gage, or even 500-1 if necessary. A screw permits fine adjustment. Other possible uses may

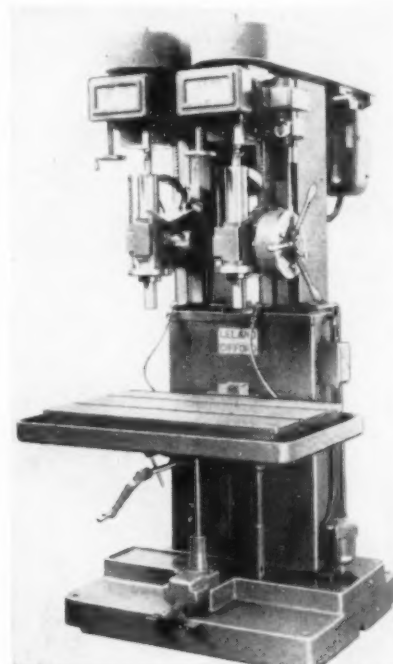


be found in static strain gages, in dynamic strain gages with a recording unit, as a center pickup unit in machine tools such as a jig borer, and as an indicator for various types of lead testers and gear checkers.

Also it is a master testing device to accurately determine flatness, parallelism, concentricity and other geometrical features of parts resting on a surface plate, clamped in required relation to a surface of a plate, or rotated on precision centers or in V blocks. The pencil slim design permits it to be used in holes, slots and grooves that would be impossible with indicators because of interference caused by the dial face or with the short distance from the stylus to the dial face. **T-5-1421**

Drilling Machine

This heavy duty drilling machine, the No. 3 MVB, can drill holes up to 1¼ inches diameter in steel or 1½ inches in cast iron. It has a 24-inch swing capacity of No. 3 or No. 4 Morse taper, and from one to four spindles.



Power, hand or hydraulic feeds are available. Power feed has three feed rates, adjustable depth stop and safety slip clutch. The hydraulic feed has either plain or step-by-step controls.

A four-speed motor with back gears provides eight standard speeds. A single-speed motor with or without back gears or a four-speed motor without back gears can also be furnished for other speed ranges.

On multi-speed machines, all speed changes including back gear shifting, are made instantly without stopping the machine or the operator moving from position.

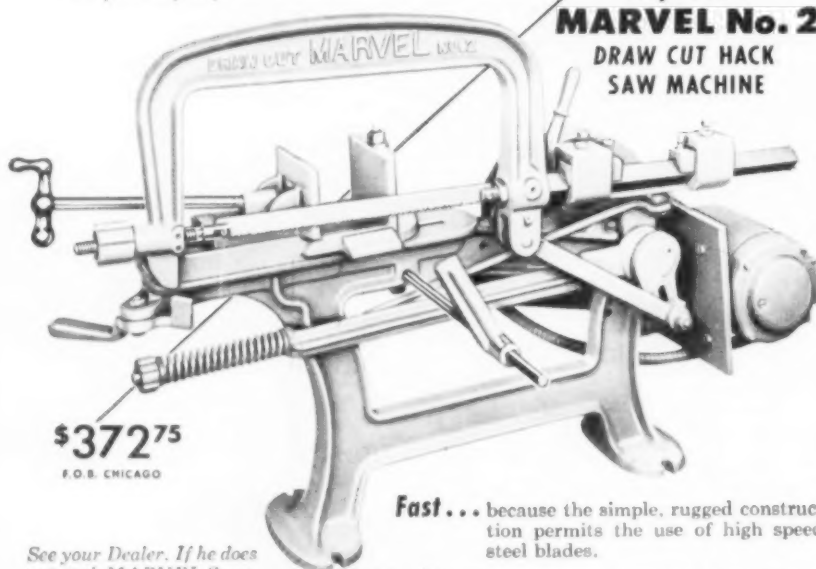
Approximate weight for four-spindle machine with four-speed motor is 9800 lb.; floor space is 76x61¾ inches. Over-all height is 92¾ inches. Made by the Leland-Gifford Co., Worcester 1, Mass. **T-5-1422**

For... General-Purpose Sawing

FAST-ACCURATE-ECONOMICAL-DRY CUTTING

Capacity up to 8" round

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MARVEL No. 2
DRAW CUT HACK
SAW MACHINE



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Fast... because the simple, rugged construction permits the use of high speed steel blades.

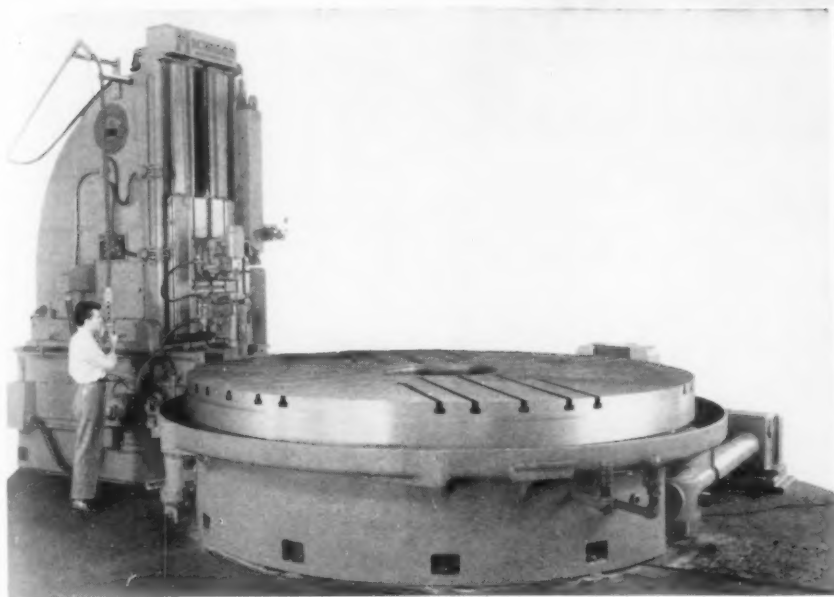
Accurate... because the improved Saw Frame with clamping type blade holders holds the blade in perfect alignment and proper tension.

Economical... because of its automatic relief on the return stroke, the blade will last and last and last.

Dry Cutting... because modern high speed steel blades will operate efficiently at 60 strokes per minute without a coolant.



ARMSTRONG-BLUM MFG. CO. • 5700 Bloomingdale Ave. • CHICAGO 39, ILL
FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-142



Vertical Gear Shaving Machine

Large gears up to 15 feet in diameter and with up to 48-inch face width can be finished more rapidly, to higher accuracies, and at lower cost, on a line of standard vertical large-gear shaving machines made by Michigan Tool Co., 7171 E. McNichols Road, Detroit 12. The machines can be used for spur, helical, or herringbone gears, internal or external, with or without integral shafts.

The Michigan V-series standard machines are available in four models having respectively 48, 72, 120 and 180-inch gear diameter capacities. They are designed for high versatility and are provided with facilities for mounting of integral gear checking accessories, making it possible to check gears before removal from the finishing machine.

All models except the V-48 are available with dual cutting heads. The two cutting heads are independently adjustable for correct angle, and the top head may be adjusted for height. With a herringbone gear each cutter cuts one helix face so that both helices may be cut simultaneously.

The large gears are shaved by means of cutters shaped similar to gears but with the teeth serrated to provide a series of cutting edges. The rotary cutter and gear rotate in mesh with the work driving, but the axes on which the gear and cutter are mounted are not parallel. With this crossing of gear axis and cutter axis, each cutting edge sweeps in a shearing action across some part of the gear tooth as the gear revolves.

In addition to the dual cutter heads, each cutter is available in a new form, actually two cutters in one. This cutter,

though of one-piece construction, has a wide groove in its center section, giving the effect of two separate cutters, providing two shaving zones on the gear. Each shaving zone guides and steadies the other shaving zone.

A checking device has been designed for the V-series machines so that a gear can be checked for a runout on both the shaft and rim, and axial pitch while on the worktable. The checking device is mounted independently on the vertical slide. Vertical gage blocks are used in conjunction with the micrometer when checking axial pitch.

The large tables are set on a massive cast iron base. The vertical slide is on a large heavy casting which is set on a huge base casting. Design is such that there is complete rigidity.

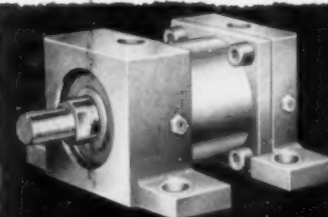
The head of the machine that mounts the serrated tooth shaving cutters, which are meshed with the gear and traverse back and forth across the tooth face while being fed to depth, can be tilted forward or backward. This feature enables the gear tooth shaved surface to be intentionally tapered to provide total face width contact under deflection conditions that result from the heavy loads transmitted by the gears in service.

Provision is made for mounting a turning tool on the lower cutter head in order to take a cut across the top of work holding fixture, thus insuring a plane surface, for mounting the gear, parallel with the top of the worktable. Another design feature of the line of machines is the use of T-slots in the table. This enables fixtures and gears to be mounted in the shaving machine, with absolute concentricity between the shaved gear tooth surfaces and the table bearing.

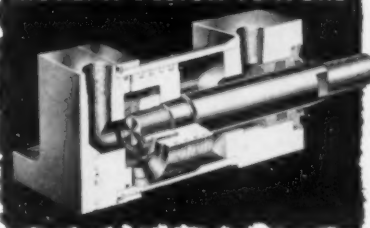
T-5-1431



HYDRAULIC CYLINDERS



EVERY MODERN DESIGN FEATURE

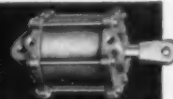


- 2000 p.s.i.
- Compact design
- J.I.C. Standards
- 11 models in 11 sizes
- Up-to-date engineering
- All steel construction
- Wide choice of rod sizes
- Quick-change packing cartridge



S-P makes hydraulic cylinders for the world's largest corporations. Representatives in principal cities. Prompt deliveries. Send for copy of S-P Catalog No. 103.

S-P AIR CYLINDERS



Famous for long life—low downtime. Piston packings "replace" themselves. Prompt deliveries. Send for Catalog 102.

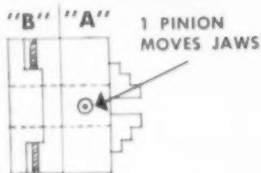
OTHER S-P PRODUCTS: Power Chucks, Rotating Air Cylinders, Parallel Grip Collet Chucks, Drill Press Chucks, Expanding Arbors, Blank Jaws, Air Valves, Air Pistons, Air Control Accessories.



THE S-P MFG. CORP.
ESTABLISHED 1916
12415 EUCLID AVENUE
CLEVELAND 6, OHIO
A Bassett Company

INDICATE A-5-143

The UNIVERSAL Chuck with .0005 PRECISION!



HOW and WHY it Works

Chuck gripping section "A" is like any scroll chuck with one pinion to make jaws accurate to .003". Section "B" shows how chuck "floats" on adapter (.020" clearance) where 4 opposed screws move chuck on adapter for adjustment to dead true precision. Jaws always come back within .0005" on duplicate work.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-144-1

Buck **ADJUST-TRU** **CHUCKS**

6 JAW 6" CHUCK HANDLES WORK OF 93 COLLETS!

The capacity of \$1,000 worth of collets for your tool room PLUS scroll chuck re-chucking speed on duplicate parts with .0005" precision . . .

The firm grip of 6 jaws for soft metal or tube work . . .

An end to most needs for stub arbors, mandrels, or special fixtures . . .

A reliable precision chuck adaptable to lathes, screw machines, grinders, dividing heads . . .

The greatest development of recent years to save machinists' time . . .

That's the brief story of this sensational Adjust-Tru chuck. It is unbelievable — but true! Send for catalog with full details.

SIZES AVAILABLE

3- and 6-Jaw Chuck—4" (light duty); 5", 6", 7½" (heavy duty)

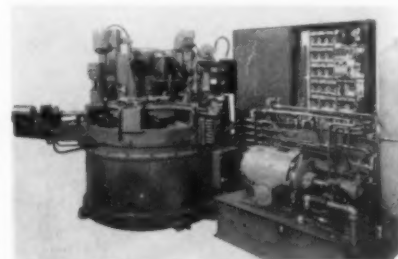
2-Jaw Aviation Chuck—6", 7½" (heavy duty)

BUCK TOOL CO.

533 Schippers Lane • Kalamazoo, Mich.

Assembly Machine

A semi-automatic, hopper-fed, eight station, oil pump assembly machine is announced by Douglas Tool Co., 2300 E. Nine Mile Road, Hazel Park, Mich. A combination hydraulic and mechanical system actuates this machine. Two hundred-eighty oil pumps can be assembled in one hour at 80 percent operating efficiency. There are three simple manual operations, each re-



quiring one man. Pump bodies are loaded and finished assemblies are unloaded by one man. At station 1, the pump body is automatically clamped into place. Station 2 is an idle station. A hopper feeds in the idler gear shaft and presses this shaft into position at station 3. It is automatically checked for proper alignment at station 4 and is either accepted or rejected. Dowel pins are hopper-fed into position and pressed in at station 5. An operator at station 6 inserts the idler gear, drive shaft and gear assembly, and puts a gasket into place. At station 7, the operator puts the cover on the oil pump and starts four cover screws. The cover screws and the pressure relief valve nut are automatically driven and torqued at station 8. When these operations are completed, the machine unclamps the oil pump and it is ready for removal by operator at station 1.

T-5-1441

Hand Clamp

A Saxton Kant-Twist clamp, with a capacity range of from 3 to 12 inches, has been perfected from new metal alloys which enables it to produce the same gripping or clamping strength and yet is 65 percent lighter than other types of clamps of comparable size and strength, according to Centinela Industrial Supply Co., 11930 Inglewood Ave., Hawthorne, Calif.

The unit features positive parallel action of the cantilever jaws which eliminates damage from wracking stress and insures true-action life as much as 400 percent longer than other types of clamps. Screw and head are fabricated from one-piece alloy steel and completely supported at both ends. The ¾-10 Acme thread will withstand many abusive clamping operations. T-5-1442

NEW Dial Bore Gages

Range 3/8"-1"

Models 4-5

Delivery: 2 wks.

Range 7/16"-3/8"

Models 2-3

Delivery: 3 wks.

Range 3/32"-3/16"

Models 0-1

Delivery: 3 wks.

Range 1"-12"

Models 6-10

Delivery: Stock.

**perfect visual control
at machine as well as
at inspection . . .**

Available from smallest model
checking .090" bore to largest
checking 48 inch bore.

Speed up production; reduce
scrap; save time; save \$\$\$\$.

Please ask for catalog D.B.M.

NILCO

NILSSON GAGE CO., INC.
Poughkeepsie, New York

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-144-2

Sheet Separators

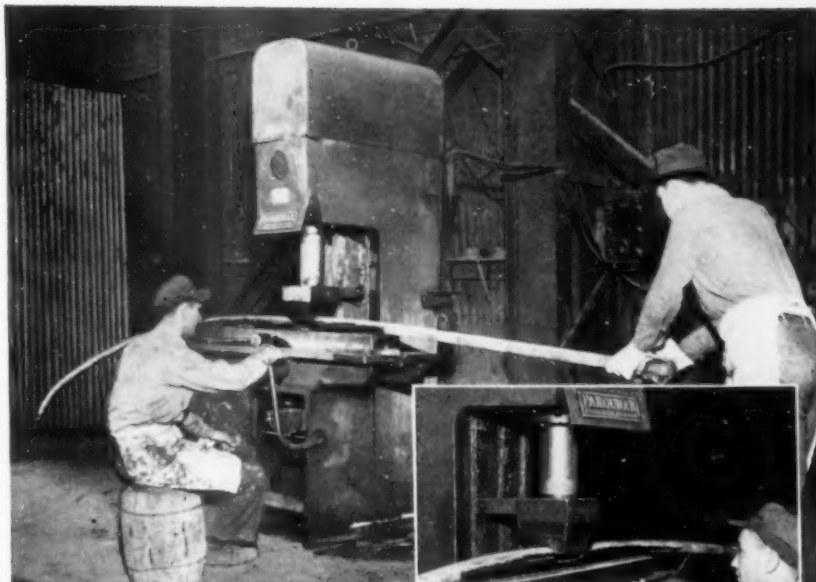
Employing the magnetic principle that like poles repel one another, the Basco Mfg. Co. has improved a device that automatically separates steel sheets of any shape. The unit comprises a permanent magnet that induces a magnetic field in the stacked steel sheets which tend to repel each other, causing the ends of the sheets to fan out with air space between them.



No matter what the coating on the steel sheets, oil, grease, etc., the separator will float each sheet, making it a simple matter for operators to feed presses, brakes, shears and other metal fabricating machinery. It is a completely self-contained unit requiring no outside connections. Cast aluminum mounting plates are reinforced with stainless steel wear strips to assure long life. When used, it quickly and automatically causes steel sheets to open up for easy grasping of the top sheet. The danger of cuts and lacerations to operator's hands is reduced considerably and there is no chance of damaging costly dies because more than one sheet is fed. Highly polished or painted sheets separate without scratching. It will handle round and odd shaped sheets, as well as straight edges.

Four standard models are available to handle sheets of 20 gage and lighter to heavier sheets than 12 gage. Permanence of the magnetism is guaranteed for the life of the unit. Manufactured by Basco Mfg. Co., 5 Woodside St., Stamford, Conn. **T-5-1451**

USE READER SERVICE CARD ON PAGE 139 TO REQUEST ADDITIONAL TOOLS OF TODAY INFORMATION



Farquhar Hydraulic Press at the Weirton Steel Company straightens stopper rods. It has doubled production, required practically no maintenance.



Farquhar Hydraulic Press at the Weirton Steel Co.

"eliminates breakage of rods...increases production 100%"

The Weirton Steel Co., Weirton, W. Va., formerly straightened stopper rods with a steam hammer. The operation was slow and resulted in a high percentage of breakage. Seeking a better method, Weirton officials bought a Farquhar Press to speed production. Not only has the press increased production 100%, but it has eliminated breakage of rods. In addition, Weirton reports that in the six years this press has been operating, "practically no maintenance has been necessary."

Farquhar Presses Cut Your Costs

Just one more example of cost-cutting Farquhar performance in modern production! Farquhar Presses are

built for the job... assure faster production due to rapid advance and return of the ram... greater accuracy because of the extra guides on the moving platen... easy, smooth operation with finger-tip controls... longer life due to positive control of speed and pressure on the die... long, dependable service with minimum maintenance cost.

Farquhar engineers are ready to help solve whatever production problem you may have. Send for free catalog showing Farquhar Built-for-the-Job Presses in all sizes and capacities. Write to THE OLIVER CORPORATION, A. B. Farquhar Division, Hydraulic Press Dept., 1519 Duke St., York, Pennsylvania.

Farquhar

HYDRAULIC PRESSES

for Bending • Forming • Forcing • Straightening • Assembling • Drawing
Extruding • Joggling • Forging • and other Metalworking Operations

THE OLIVER CORPORATION, A. B. FARQUHAR Division

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-145

since 1931

CUTTING ENGINEERING OVERHEAD

A major contribution of independent production engineering firms to industry has been the reduction of engineering overhead through elimination of excess staffs to handle seasonal peaks or periodic overloads.

Yet this needed staff remains available on a few hours notice for either a complete engineering program or any part thereof.

With Pioneer as their leader since the 1930's, independent engineering companies have consistently cut overhead as well as manufacturing costs for their customers.

Pioneer
ENGINEERING
& MANUFACTURING CO., INC.



19645 JOHN R STREET
DETROIT 3, MICHIGAN

INDICATE A-5-146-1

Micro-Height Gage

The Micro-Height gage combines the easy reading of a micrometer caliper with the scribing features of a vernier height gage. It comes equipped with a high-speed steel scriber which gives it a 2 inch direct capacity with the scriber inserted in the support with the straight edge down.

By reversing the scriber in the support, exactly one inch is gained. This increases the direct capacity of the gage to three inches. By using the Micro-height gage on a toolmaker's 1-2-3 block, measurements can be made up to six inches.

Having a lead screw that is heat treated and accurately ground, it is possible to replace the scriber with a dial indicator and it is possible to determine quickly and accurately the amount of error on center distances or surfaces so that corrections can be made in the work. It makes an excellent inspection gage on short-run production pieces.

Large graduations on the barrel, from zero to two inches, are easy to read and help to eliminate errors. Micrometer adjustments are made with the knurled thimble on the top of the gage. Large, easy-to-read graduations on the head make rapid, accurate setting possible.

The Micro-height gage is rugged and precision built. It is an efficient tool for faster and better work by toolmakers, template layout men, and inspectors.

Made by the Fairfield Gage Co., Inc., 166 Herbert St., Bridgeport 6, Conn. **T-5-1461**

Small Air Cylinder

Air-Mite, Chicago, has announced the addition of a new Micro model cylinder to its line of small sized air cylinders. The model has a one-inch stroke and is suitable for use in small jigs and fixtures where size and space limitations are primary factors.

Although small in size, they deliver 75 pounds thrust on a 100 lb. line pressure. Equal ram pressure is given at any stroke point on the new cylinder one-inch stroke.

These small air cylinders lend themselves to a wide range of uses—such as for ejection or injection of work, for holding or clamping parts for welding, riveting, drilling, bolting, etc., or for any other processing or assembling operation where speed and accuracy, combined with minimum labor cost, are important.

Any number of cylinders, from one to several hundred, can be operated by a single control valve. Cylinders are machined from solid brass bar stock, eliminating the possibility of rusting, or pitting of cylinder walls. **T-5-1462**

since 1931

COMPLETE ENGINEERING RESPONSIBILITY

Pioneer offers industry an industrial engineering service proven capable of handling every detail of the most complete program.

Its customers find that dealing with one group of engineers qualified to handle all phases of industrial engineering reduces cost, saves time, and promotes better coordination.

Pioneer is able to do this because it employs the most qualified of engineering manpower --- capable of supplementing your engineering staff.

Pioneer
ENGINEERING
& MANUFACTURING CO., INC.



19645 JOHN R STREET
DETROIT 3, MICHIGAN

INDICATE A-5-146-2

Thread Unit

A Murchey Precision-Pak threading unit is announced by The Sheffield Corp., Dayton 1, Ohio. Designed to meet the requirements for high production and precision—it is a compact and rugged, self-contained power package. The device brings to the threading field a fully automatic power unit with such features as direct precision lead, rapid return of the tool spindle, variable speeds, flexibility of application, and low cost of maintenance.



The unit has a hardened and ground spindle driven by a three-hp motor. Precision lead is maintained throughout the entire feed travel of four inches by a hardened and ground quick change lead screw and collapsible lead nut head which is mounted directly on the rear end of the spindle. At end of feed travel, lead nuts are automatically disengaged and rapid spindle return is obtained through a planetary gear clutch.

The unit is adaptable for mounting in most any position such as horizontal, vertical, or angular, in single, double-end or multiples. Used in conjunction with Murchey collapsible taps and self-opening die heads, it is suited for production of such precision threading applications as shell tapping, rocket threading, aircraft, automotive, and other similar operations. **T-5-1471**

Profile Template

Both a male and female profile are obtained in a matter of seconds with the Ajusto profile template. Hours of painstaking template-making are eliminated yet, accuracy is assured, for the Ajusto is composed of a number of hard brass strips, each one only 0.007 inch thick. This permits close adjustment to practically any profile, yet provides extremely close tolerances.

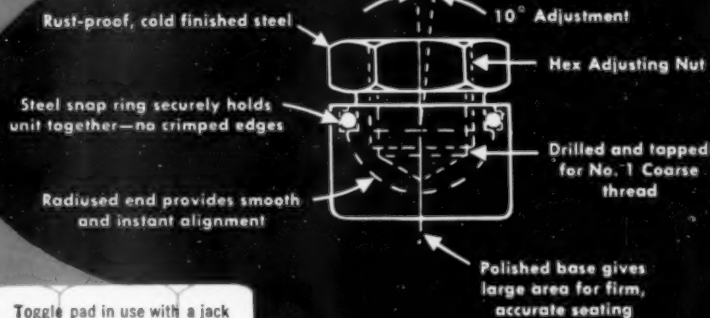
It is widely used in inspection, fabrication and duplication departments. The Ajusto is distributed by Toolcraft Mfg., Co., 6619 So. Dorchester Ave., Chicago 37. **T-5-1472**

Slips are expensive!

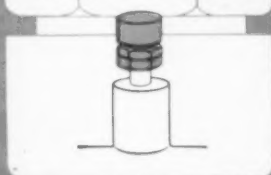
Make your clamps and jacks safer with
VLIER
Toggle Pads



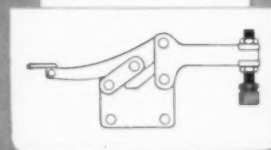
PAT. PEND.



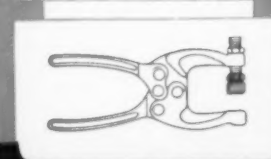
Toggle pad in use with a jack



Toggle pad demonstrated on a toggle clamp



Toggle pad on toggle pliers



Yes, clamping on uneven or off-angle surfaces is safer and surer when VLIER Toggle Pads are used. They insure more accurate holding with almost any type of clamp or jack because of their self-aligning and leveling ability. Each has a 20° (included) angle of movement. A special "jamming" feature prevents loosening during work, yet allows easy removal.

The finest steels plus accurate manufacture and efficient design give instant alignment, eliminate "dead spots" and prevent marring of fine surfaces. These unique tools are available in five sizes and are fully guaranteed. Look at their many features, then order from your nearby VLIER Distributor.

Send for catalog No. 53



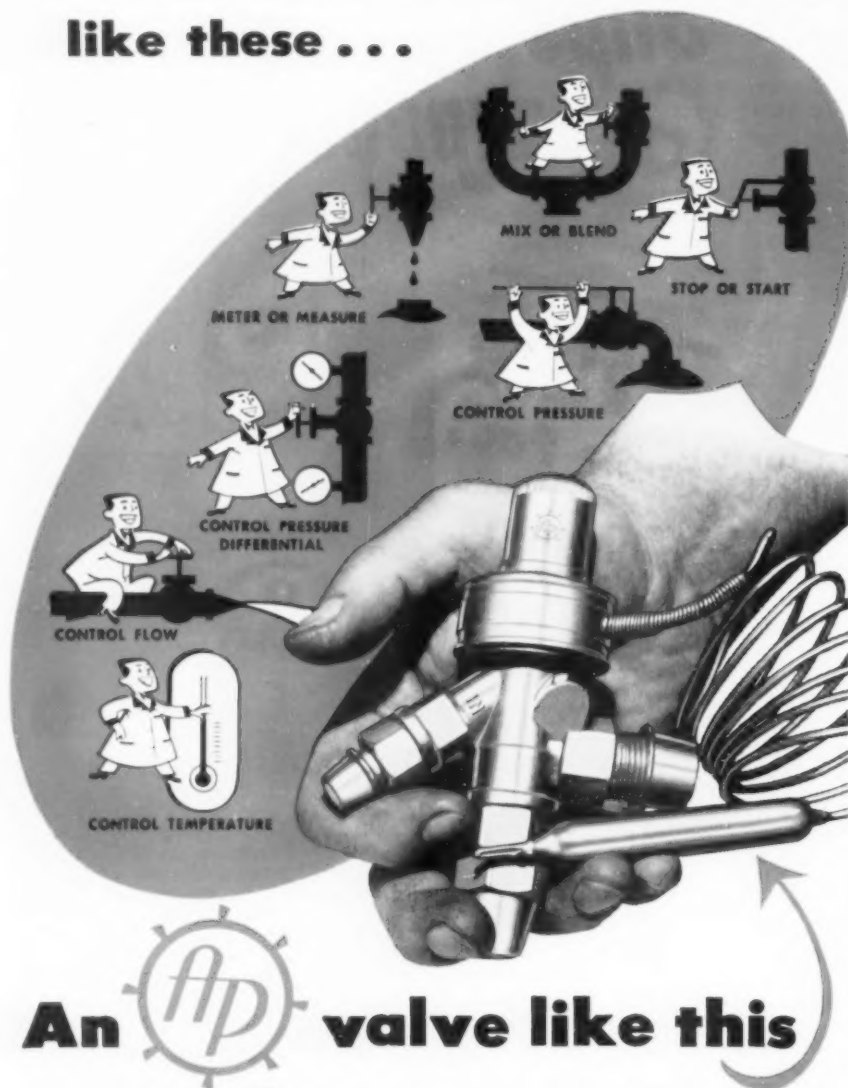
VLIER ENGINEERING, INC.

4552 BEVERLY BLVD., LOS ANGELES 4, CALIFORNIA

Distributors of Torque Thumb Screws, Spring Plungers, Spring Stops and Fixture Keys.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-147

If you have flow-control problems like these . . .



An **A-P** valve like this may be your answer

WHEN you have an automatic flow control problem involving liquids, gases, air or refrigerants . . . chances are that one of the many standard A-P valves will give you the solution. If not, A-P engineers will be glad to work with you, developing a special valve for your particular needs. Tell us about your problem in a letter, today. We can help you.

- Solenoid valves
- Automatic throttling and expansion valves
- Thermo-electric valves
- Aircraft valves
- Pressure or temperature controlled valves
- Pressure limiting valves
- Refrigerant valves
- Constant-level liquid valves

A-P CONTROLS CORPORATION

HEADQUARTERS FOR AUTOMATIC FLOW-CONTROL ENGINEERING
2402 N. 32nd Street, Milwaukee 45, Wisconsin



DEPENDABLE Controls

for Air • Gases • Liquids
• Refrigerants

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-148

Large Chuck

Demand for larger chucks with the patented Buck Adjust-Tru principle have resulted in the development of this nine inch Adjust-Tru chuck. It embodies all the features of the smaller chucks, guaranteeing 0.0005 inches precision within 1 minute on original



chucking, and universal scroll chuck rechucking speed on duplicate work, plus generated teeth on the pinion and bevel gear portion of the scroll, for smoother operation. The new Buck chucks hold work up to eight inches in diameter. It is available with 3 or 6 internal and external jaws. For information write Buck Tool Co., 2015 Schippers Lane, Kalamazoo, Mich.

T-5-1481

Punch Press

One of the features of the DASHapress is the central electronic control system which literally thinks for itself. This electronic brain provides both a central cycling and timing mechanism for the machine, as well as a dual safety control. It provides instant stoppage of the machine if the safety device should fail to function.

This 25-ton capacity DASHapress is designed with wide platen areas, 21 $\frac{3}{4}$ x 9 $\frac{3}{4}$ inches, which permit extreme diversification of application. Material can be fed into the machine from any of the four sides in strip or cut form and the machine is especially adaptable to forming radio chassis, toys, gaskets, metal stampings or any other parts requiring a large die area.

Compact in design, the DASHapress is 4 feet 6 inches in height. It operates at a rate of 90 to 120 strokes per minute and is equipped with a double undercrank pull down drive and a single revolution or continuous clutch. Variable shut die heights and ranges are available to meet user requirements.

For further information, write to Dashew Business Machines, Inc., 1641 McGarry St., Los Angeles 21. **T-5-1482**

Lubricant

Molykote, type U, a grease consistent mixture for extreme bearing pressure lubrication at temperatures ranging from -40 F to approximately 400 F is announced by The Alpha Corp., 179 Hamilton Ave., Greenwich, Conn.

The new lubricant is identical to the company's Molykote, type G, except that instead of a petroleum lubricant being utilized as a carrier, polyalkylene glycol is used. Molykote, type U, is particularly adaptable for use in extreme temperature applications in aircraft and has proven unusually successful as a lubricant for rubber shaft seals rotating at speeds as high as 8000 rpm. It can be used for temperatures up to approximately 800 F, in which case the carrier evaporates, leaving the Molykote powder impregnated on the surface for lubrication.

It leaves a carbon residue of less than 0.01 percent. It has great resistance to sludge, gum or varnish formation and it is compatible with practically all materials, including natural and synthetic rubber, leather, etc. **T-5-1491**

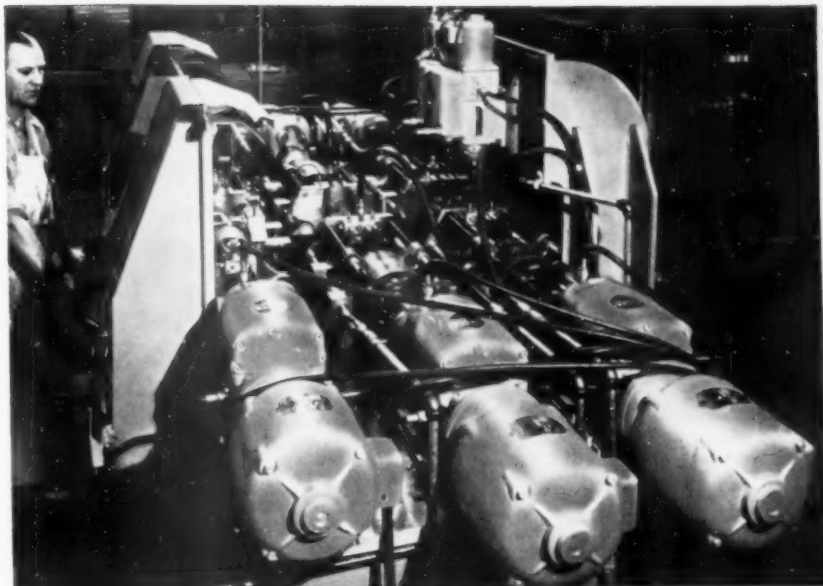
Dye Penetrant Inspection

A packaged kit for a more reliable dye penetrant test to locate cracks in any solid material is available. Features include spray can sealing of messy constituents for cleanest and most conveniently rapid spray application to any part.

For plant maintenance of mechanical equipment or for tool inspection for weld, casting, or forging inspection, or for overhaul tests of any transportation equipment, the Spotcheck kit is carried in one hand to the parts in question, and tests for cracks carried out in a few minutes. No power or special lights are required.

The dye penetrant is pressure-can sprayed on the clean surface to be tested. Spraying is easy and non-critical. Then a cleaner is sprayed on the surface, and removed by a quick wipe. An even coat of white developer is brushed on, and inspection follows in a few seconds. Cracks show up as bright red lines, and pores or leaks in tanks show as bright red spots.

As the Spotcheck name implies, this inspection is best and cheapest when applied to local areas of large parts, or in remote locations where only a few parts are to be tested. The test is readily used wherever a few parts are infrequently tested, as in a toolroom or tool crib. For further information, write to Magnaflux Corp., 5900 Northwest Highway, Chicago 31. **T-5-1492**



Machine Details

Dimensions: 10 3/4' long, 6 1/2' wide, 7' high; weight about 16,000 lbs. 8 Delta drill units: 6 Model 19-400; 2 Model 19-150. 5 drill units equipped with multiple-spindle drill heads. Total HP—13.



Control Panel

Selector switches make possible any combination of 3 positions, 8 stations—a universal machine. Operator presses a starting button; sequence of operations is automatic; machine stops automatically when work is finished. 3000 feet of wiring between panel and machine.

When conventional tools required 25 minutes to complete 9 holes in a spirit-duplicator cylinder, A. B. Dick engineers built their own special horizontal drilling machine, using 8 Delta air powered hydraulic drill units, and now do the job in less than two minutes.

Their new machine drills, spot faces and reams 9 holes in aluminum cylinders—needs but a single operator, has automatic remote control.

Operation of this 3-position, 8-station machine consists of loading and pressing the starting button. The Delta drill units operate in four banks, in automatically controlled sequence of drilling, spot facing, milling and reaming. When the cycle is completed, the finished piece returns to original position and the machine stops. It is uni-

From 25 minutes
to 2 minutes
—that's the time saved
by A.B. DICK CO.
with 8 DELTA
AIR-POWERED
HYDRAULIC DRILL UNITS

versal—handles any piece up to 12" diameter and 24" length.

"This machine is so fast and so accurate," says Edward Brenn, design engineer, "that 3 or 4 days use per month is ample to keep up with production demand. The operator is free for other duties. We just didn't have the equipment to do this job economically—so we built the machine ourselves."

Three Delta air powered hydraulic drill unit models are now available to meet your specific requirements—1 1/2", 4" or 6" stroke; No. 80 to 1" diameter drill. See your authorized Delta drill unit dealer—write for new catalog.

DELTA QUALITY MACHINE TOOLS
Another Product of **Rockwell**

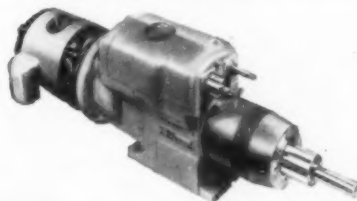


Delta Drill Unit Division
Rockwell Manufacturing Company
620E N. Lexington Avenue,
Pittsburgh 8, Pa.

☐ Please send catalog AD-723.

☐ Send name of nearest authorized Delta drill unit dealer.

Name _____
Position _____
Company _____
Address _____
City _____ Zone _____ State _____

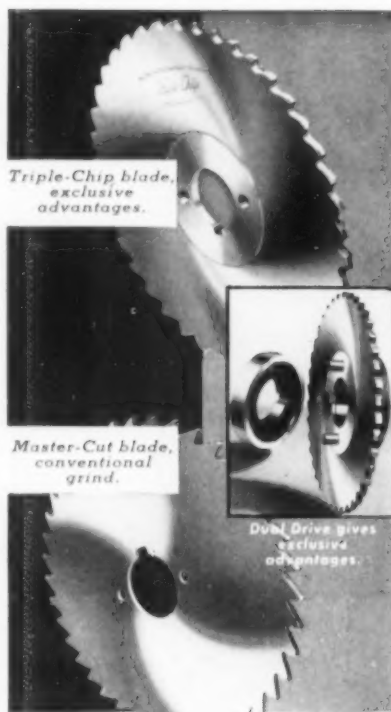


**DELTA QUALITY
MAKES THE DIFFERENCE**

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-149

May, 1953

149



**THE
MOTCH & MERRYWEATHER
OFFERS YOU EXCLUSIVE
ADVANTAGES FOR
SLITTING AND SLOTTING**

• Let M & M Triple-Chip saw blades give you the higher production-with-accuracy which Industry must attain and maintain today. Also Master-Cut conventional grind with exclusive Dual Drive. Ask your dealer.

**INVESTIGATE, TOO, THIS
VALUABLE AID TO
PRODUCTION**



DISTINCT ADVANTAGES

For the most favorable results, time- and profit-wise, use Motch and Merryweather's superb coolant. Anti-weld averting pickup. Sharper tools and longer-lived. Oily, but not "greasy". Smokeless, odorless. A real aid to money-making production.

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO



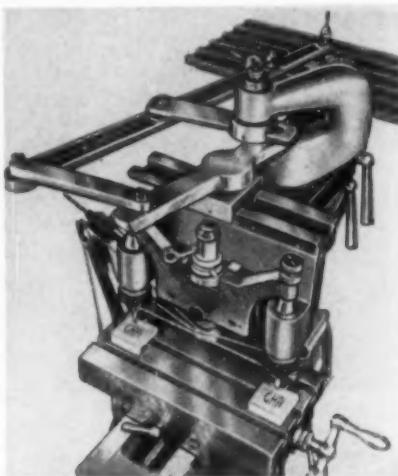
**REMEMBER — IT'S THE COST
PER CUT THAT COUNTS!**

Only
M & M builds
ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

INDICATE A-5-150-1

Engraving Machine

To double the production of engraved parts, J. Arthur Deakin and Son, 150-28 Hillside Ave., Jamaica 2, N.Y., is introducing the Alexander two-spindle engraving machine.



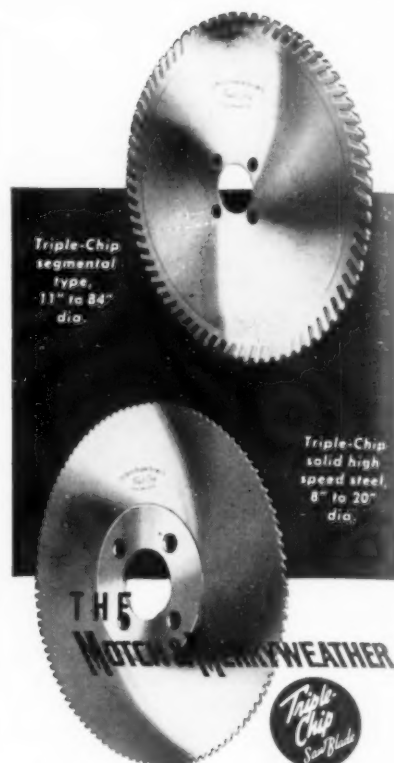
The pantograph of this machine transfers the engraving movement from one master to two copying spindles, which are held by a unique spindle support. Two rigid roller slides, working at right angles to each other, provide the movement for the spindles. This construction permits extreme spindle sensitivity and produces accurate engraving. Both cutters are set on the same plane. Spindles can be adjusted individually and instantly to equalize the depth of cut. Coarse and fine adjustments for both spindles are controlled by a single lever. T-5-1501

Simplified Tank Controls

Introduced as Johnson tank controls, the new approach is said to reduce the task of controlling levels in tanks, vats or other vessels to a matter of three time-tested, standardized components: an electrode holder, a relay and a direct operated solenoid valve.

In operation, two stationary electrodes are suspended in the tank where a circuit between them is established or broken by the rising or falling of the liquid level. This circuit actuates the relay which, in turn, operates the solenoid valve. This valve may be installed in either the tank supply or discharge line, whichever operating conditions require for proper level control.

Components are available in several sizes, giving the Johnson tank controls flexibility to answer a wide range of requirements. They can be used with liquids of all types. For complete information, write to the Johnson Corp., Three Rivers, Mich. T-5-1502



**GIVES YOU EXCLUSIVE
ADVANTAGES IN CUTTING OFF
STOCK FAST AND ACCURATELY**

Fast, burrless cut-off of shapes and tubes up to 30" round. Let M & M Triple-Chip saw blades give you the higher production-with-accuracy which Industry must attain and maintain. Ask your dealer.

**INVESTIGATE, TOO, THIS
VALUABLE AID TO
PRODUCTION**



DISTINCT ADVANTAGES

For the most favorable results, time- and profit-wise, use Motch and Merryweather's superb coolant. Anti-weld averting pickup. Sharper tools and longer-lived. Oily, but not "greasy". Smokeless, odorless. A real aid to money-making production.

THE MOTCH & MERRYWEATHER MACHINERY CO.

715 PENTON BUILDING
CLEVELAND 13, OHIO



**REMEMBER — IT'S THE COST
PER CUT THAT COUNTS!**

Only
M & M builds
ALL 3:
CIRCULAR SAW
SAW BLADE
BLADE GRINDER

INDICATE A-5-150-2

Diameter Gage

Floating carriage diameter measuring machines are available in three models of different capacities; up to 4 inches with 8 inches between centers, up to 7 inches with 12½ inches between centers and from 6 to 12 inches with 14 inches between centers. The machines check all diametral thread elements simply and accurately.



In principle the machines consist of a sturdy cast iron base mounting two accurately aligned and adjustable centers. At right angles to the axis of the centers is a freely moving measuring carriage mounted on balls in V ways and carrying a micrometer and highly sensitive reference point indicator. This carriage permits measurements to be taken along the center line and at right angles to the work.

The micrometer unit has a large anti-glare matt chrome drum, with clearly defined graduations. A vernier scale permits direct readings to 0.00001 inch. Nonrotating anvils are fitted to the micrometer in order to minimize wear at the point of contact. Reference point mechanical indicators enable the thread elements to be measured to within 0.00001 inch irrespective of the 'feel' of the micrometer. They are of the latest over-run type which will not easily suffer damage by excessive pressure or rough handling.

Made by The Sheffield Corp., Dayton 1, Ohio. **T-5-1511**

Grinding Wheel Dresser

Model #6, Newman Grinding Wheel Dresser is a universal model. It is flexible and can be bolted down for cutter grinders or cylindrical grinders or can be used on the magnetic chuck for surface grinding. The shaft can be tipped all the way forward or backward and the dresser wheel unit can be adjusted up or down or made to swivel on the shaft depending upon the angle desired for dressing or truing the grinding wheel. Model #6, with N-D1-46 or N-D2-46 wheels is an excellent diamond wheel dresser. All Newman replacement wheels are interchangeable on all models. Therefore, the dressers are adaptable to many varieties of grinding wheel dressing. **T-5-1512**

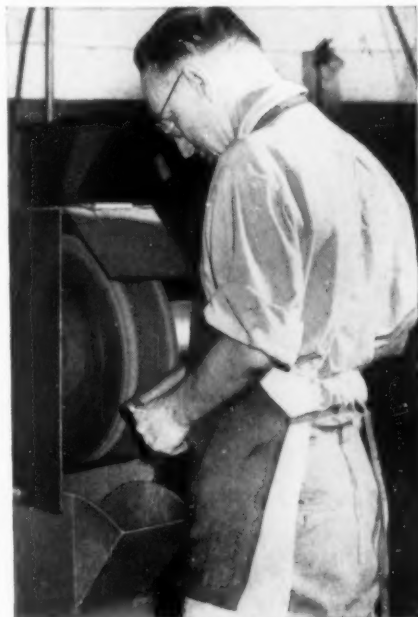
Backstand Belts cut finishing time 70%

**5 minutes on a set-up wheel cut to
1½ minutes with Armour Backstand Belts**

Changing from set-up wheels to backstand belts saved 3 minutes 39 seconds in finishing forged paving breaker handles, reports a well-known company*. This operation formerly took 5 minutes 11 seconds. And this wasn't the only saving. Backstand belts outlast 4 to 5 set-up wheels; without dressing they remain flat and true. And due to their uniform grit, they give a better finish.

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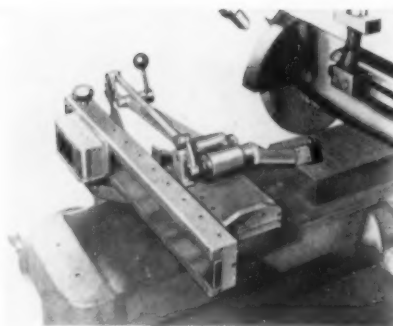
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Firm _____
Address _____
City _____ Zone _____ State _____ T _____

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-151

Contour Wheel Dresser

The KB11-3 Hoglund contour dresser will fit on any horizontal surface grinder and will dress up to 3-inch wide, 20-inch diameter wheels. Other features include accuracy to 0.0001 inch; simple operation; lighter, more compact, and better balanced dresser without interfering overhang; magnetic-chuck mounting for short runs, permanent mounting at end of chuck for long runs. Its light weight enables it to be moved from one machine to another, dressing different forms on each grinder by just changing the template. It dresses any contour, no matter how complex, that can be entered by the diamond.

The dresser is manually operated, with a minimum of skill required. The operator keeps the stylus in contact with the template with his left hand and moves the template slide back and forth with his right. Diamond movement across the wheel is reduced from the enlarged template by means of an inclined plane and slide arrangement. Vertical movement is reduced by a ratio arm. Thus, the complicated linkages associated with the pantograph have been eliminated. The result is greater accuracy and simpler operation.



A microscope fixture eliminates all guesswork in setting the diamonds. The reticle has 4 concentric rings, 0.005, 0.010, 0.015, and 0.025-inch radius, corresponding to each of the radii of the diamond tools. Diamonds can be set in their holders and then held ready for immediate use without any machine down time. Another advantage is that diamond wear is clearly visible. The main casting is high-tensile-strength aluminum alloy. All main bearings are zero precision, preloaded tapered roller bearings and preloaded precision ball bearings. All other bearings are permanently lubricated Oilite. The slides operate on ball bearing raceways and all essential parts are hardened, ground, and lapped.

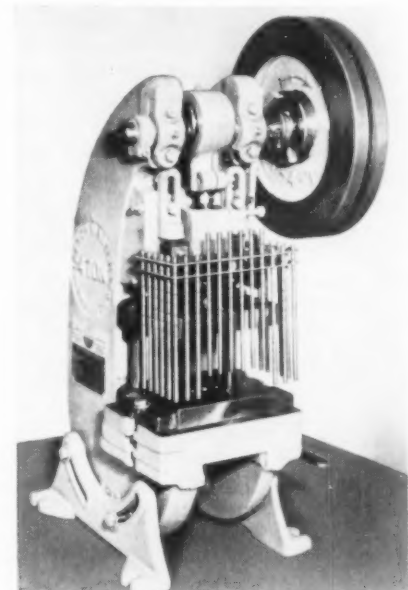
Standard equipment includes one

storage cabinet; one microscope; one diamond setting fixture; three styli; three diamond holders; one roughing diamond; three finishing diamonds with radii and included angle depending upon the work; three Allen wrenches; one stylus clamping screw and one master setting gage. Maximum depth of contour on the wheels, depending on model, ranges from 1/2 to 1 1/2 inches.

Made by Hoglund Engineering and Mfg. Co., Inc., 343 Snyder Ave., Berkeley Heights, N. J. **T-5-1521**

Punch Press Safety Guard

The Benchmaster barrier-type punch press guard provides maximum operator safety regardless of die used without sacrificing press efficiency. It fits all Benchmasters as well as other presses.



Design is extremely simple and flexible. By dropping numerous vertical rods, the number depends on size of bolster plate, through any pair of prelocated holes in horizontal guard plates, a protective cage is set up around the die area. Virtually any shaped contour can be formed by simply varying the height and position of the rods in the guard plates. The rods are held at desired heights by means of small clips. To change the pattern for a new die requires only seconds. Openings in the guard can be arranged to permit parts to be inserted in or ejected from the die.

The guard is easily and quickly attached to almost all makes of punch presses. It can be also used in conjunction with almost all makes of punch hand trip guards. For literature write to Benchmaster Mfg. Co., 1835 West Rosecrans Ave., Gardena, Calif.

T-5-1522

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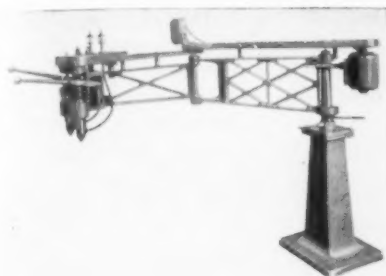
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State _____

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-152

Radial Arm Drills

Ekstrom, Carlson & Co., Rockford, Ill., has recently added a number of double spindle type DS models to their line of radial arm drills.



Similar in design and general appearance to their earlier single spindle models, the Type DS machine is available in two sizes with three models of each. All six have a fixed center-to-center distance of 6 inches between drill spindles, and also the following identical specifications: dual spindle speeds of 5000 and 8000 rpm, maximum vertical spindle travel of $4\frac{1}{2}$ inches, maximum vertical turret post adjustment of 6 inches, drill chuck capacity of $0\frac{3}{8}$ inch, and 1-hp spindle drive motors.

The Ecco No. 30 DS incorporates a 30-inch radial reach, while the No. 71DS reach measures a full 71 inches. Any of the above models can be supplied with a gravity feed lubricating system for fast drilling in metals at a slight extra cost.

For further information, write Ekstrom, Carlson & Co., Dept. M-17, 1400 Railroad Ave., Rockford, Ill. **T-5-1531**

Centrifugal Pump

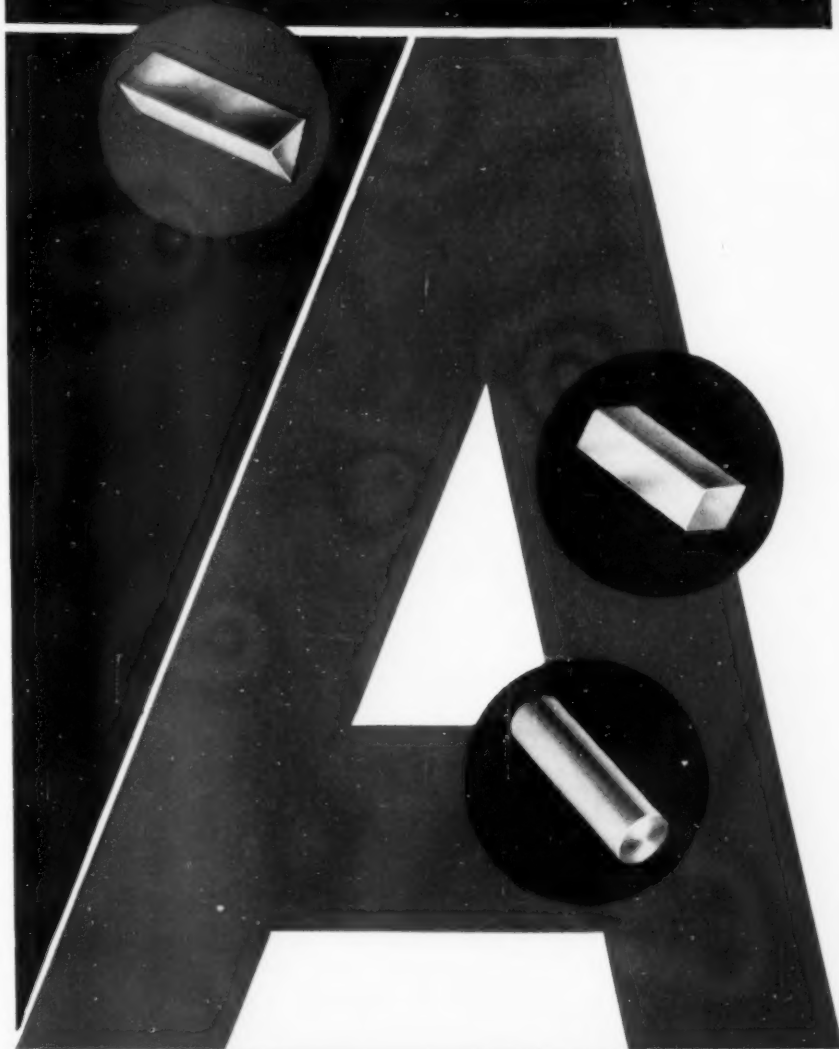
A series of hermetically sealed in oil, small centrifugal pumps known as the little giant have been added to the line of the Samuel S. Gelber Co., 162 N. Clinton St., Chicago 6. They can be used in installations where a small low pressure, high-volume pump is desired. They are made of die-cast aluminum, treated with a baked on coating to prevent corrosion.

Three sizes are available, handling from 180, 350 and 475 gallons per hour and capable of $17\frac{1}{2}$ ft. lift. They can be used either as an immersion or horizontal pump and can develop suction lift by the use of a small foot valve.

The advantages of the sealed pump: Motor windings cannot become wet. No service necessary since oil supply is sufficient for life of pump. Can be operated completely submerged and will pick up within $\frac{1}{2}$ in. of bottom. Strong and permanent. Neoprene seals enable pump to circulate liquids other than water.

T-5-1532

Endurance Insurance for your tools



- Your tools need insurance, too...the kind that Adamas Carbide gives.
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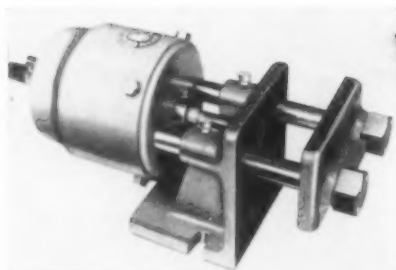
©1953 ADAMAS CARBIDE CORP. HARRISON, N.J. NEW JERSEY

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-153

Air-Controlled Vise

The Wilson Bohannon Co., Marion, Ohio, recently announced that it is marketing a new product, a simple air-controlled vise. The vise is amazingly simple and may be synchronized with operations of vertical and horizontal milling machines, drill presses, boring mills, shapers, and most any other machine tool. It is fully equipped with a Bendix-Westinghouse Robotair chamber.

The design of the RIK vise places both the air cylinder and the stationary jaw on the same side of the workpiece. This RIK feature results in greater



safety and speed for the mill operator. Because the moving jaw is at the end of the assembly instead of next to the air cylinder, the cutting tool need not pass over the cylinder. As a result, the

operator has more room to work safer and faster without putting his hands close to the revolving milling cutter when inserting and removing pieces. The RIK may be mounted easily on any machine tool. Its over-all length is 12 inches, while the height of the jaws is 5½ inches and their width, 4½ inches; jaw opening, 2 inches (special jaw opening of 6 inches available). The vise is supplied with either a type 9 BW Rotochamber which gives a clamping force of approximately 8 times the air-line pressure, or a type 12 which develops 11 times the air-line pressure.

T-5-1541

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★ With a single purpose . . .
cool operating
glare free light for
every industrial need.

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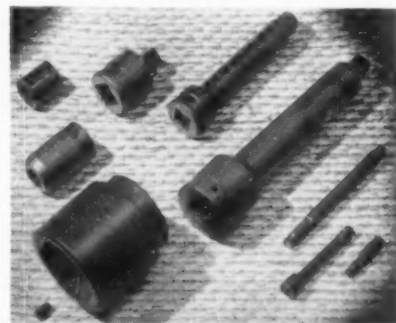
Stocker & Yale
INCORPORATED

MARBLEHEAD, MASSACHUSETTS

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-154

Power Impact Tools

The Cornwell Quality Tools Co. announces the availability of a complete line of power-impact sockets, extensions, adapters and drivers for use with Ingersoll Rand, Chicago Pneumatic, Independent Pneumatic or any other standard air or electrically powered tool. Sockets are available in square or hexagonal openings for nut sizes ranging from 3/16 to 3½ inches having drive sizes from ¼ to 1½ inches. In



addition, they can be furnished in both standard and deep lengths. Extensions are available from ¼ to 1½-inch drive sizes in a wide range of standard lengths. Adapters are obtainable to permit interchanging of sockets with other drive sizes of impact power tools. Special tools can be supplied to meet specific requirements.

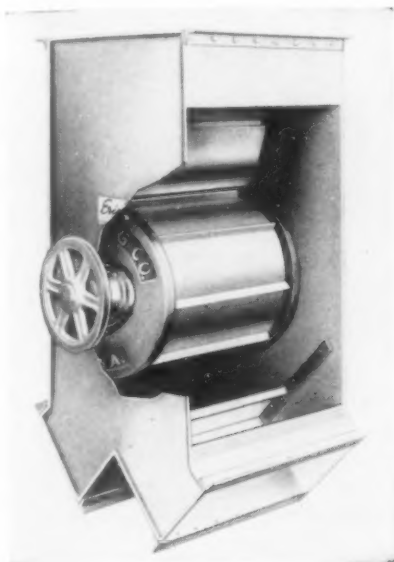
Developed for maximum wear resistance and long life, these tools are manufactured from solid bars of chrome molybdenum steel, hot broached and heat treated for proper hardness to withstand the shock and strain generated by impact guns. They are machined to tolerances established by SAE and ASA standard nut and bolt sections. All tools are thoroughly inspected, tested and held well within required tolerances to assure dependable performance.

As a supplement to the regular impact line, sockets are available for the driving of case-hardened hex head self-tapping sheet metal screws. These tools are regularly furnished in sizes from 3/16 to 9/16 inch and are case-hardened to withstand this type of usage.

T-5-1542

Magnetic Drum

Improvements and modifications designed to increase efficiency have been made on all Eriez permanent magnetic drums. It is announced by the Eriez Mfg. Co., Erie, Pa. The drums remove tramp iron and medium fine ferrous contamination automatically from materials conveyed in spouts, chutes and other conveying systems not employing belts.



Among the many improvements incorporated in the magnetic drums are: changeable sheave sizes for various operating speeds; stainless steel shells that resist pitting and corrosion; dust-tight construction; lightweight, rigid, cast aluminum sides; adjustable feeder assemblies; smooth-running and oil-sealed bearings, and extended discharge ducts.

The magnetic drum, which is available in two models with or without housing, consists of a revolving cylindrical shell within which a stationary high-powered Alnico V permanent magnet is located. Material is fed into the drum hopper where the flow is regulated by a feeding device. As material reaches the drum, the unit's magnetic field attracts and holds ferrous particles to the revolving shell. The shell then carries the material through the stationary magnetic field. Nonmagnetic material falls free from the shell at its natural tangent point, while ferrous particles are held until carried beyond a divider and out of the magnetic field.

Model DF-101 was designed to provide highest efficiency in drum separation. The unit is a feeding device as well as a magnetic separator. A reverse feed is employed with material being fed against the direction of rotation. The feed method utilizes the full effect of the drum's magnetic field; eliminates glancing and back leakage of material.

An adjustable reflector regulates and evenly feeds material at any desired speed and depth. The shell rotates on shielded dust-proof enclosed precision ball bearings. Wipers or fins across the drum shell assure the removal of foreign metal and increase the drum's structural strength. A sturdy dust-tight housing is standard.

The DF-102 is usually installed at the discharge of an open or closed chute, spout or screw conveyor. The bearings and the Alnico V magnetic element are identical with those furnished in the DF-101. Material feeds

directly to a smooth-faced shell. Back leakage of material is eliminated by a back plate on the hopper. An adjustable check gate regulates and evenly feeds material at desired speed and depth. Dust-tight operation is assured by a carefully designed housing.

Both these newly designed, improved models are available complete with motor. The 12-inch model has a $\frac{1}{2}$ hp and the 18-inch model has a $\frac{1}{2}$ hp United States Syncro-gear 68-rpm, 3-phase, 60-cycle, 220-40-v motor which can be mounted on either side of the unit.

T-5-1551

The Gairing
STANDARD
MILLING
CUTTERS

E-CON-O-MILL

**YOU'LL
SAVE**

ON INVENTORY • Same size blades, for cutting steel, cast iron or non-ferrous, fit cutter bodies of all sizes in all series.

ON GRINDING • Blades are supplied sharpened, ready for use, may be re-sharpened in or out of the body, to a gage.

WAITING for DELIVERY • All series 2500 cutters 5" to 16" dia. and all blades carried in stock for immediate delivery.

TOOLING by GAIRING

Whether you buy one or several sizes, you always save with E-CON-O-MILL. Proved savings in the cost of diamond wheels alone have caused many shops, both large and small, to standardize on E-CON-O-MILL. • But, foremost, they're efficient cutters of truly one-piece rigidity. • Get the whole story on this great development in standard tooling by writing for our E-CON-O-MILL catalog.

In Canada: A. C. Wickman (Canada) Ltd., Queensway, Toronto 14

The GAIRING TOOL COMPANY • 21223 Hoover Road • Detroit 32, Michigan

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-155

SKINNER

SCROLL CHUCKS Self-centering models for light, medium and heavy duty jobs in tool room or for production runs. Available in sizes from 3" to 18" with semi-steel or forged steel bodies, and heat-treated alloy steel for all other parts. Provided with two sets of solid jaws or two-piece jaws for holding internal or external work. Lands on the jaw, jaw steps and end bites are ground after the chuck is assembled.

INDEPENDENT CHUCKS Models for medium and heavy duty tool room and general machine shop work. Available in sizes from 4½" to 36" with semi-steel, steel, or forged steel bodies. All other parts are heat-treated alloy steel. Jaws are solid reversible or two-piece with reversible taps for either internal or external gripping. The body surrounds more than 60% of each operating screw for the full length of the screw to assure proper alignment at all times.

AIR & POWER CHUCKS Self-centering models for heavy duty production work on engine and turret lathes and automatics. Sizes from 6" to 24" with forged steel bodies, and with either 2 or 3 jaws are available. The wedge angle is such that work is gripped positively regardless of jaw position. The chuck will not release the work, even if air line is broken, until operator actuates draw bar. Skinner also has a complete line of power chucking accessories.

MACHINE VISES Skinner vises are accurate, fast acting and positive gripping. Series DPV wrench-operated Vises have semi-steel body and hardened and ground work holding surfaces. They have all the universal features so necessary for drill press operations. Clamp the work for drilling in one plane — drill — turn the vise on edge for all right angle drilling operations.

Series FS Vises have swivel base for accurate indexing necessary in milling operations. Top of the movable jaw is ground parallel to the base for use as an indicating base for setting cutters, trueing work, etc.

Details on the full line of products are included in Skinner General Catalog — write to the company or your nearest Skinner distributor for a free copy!

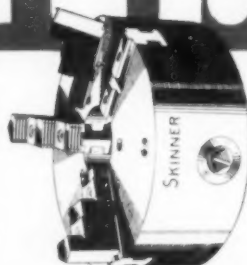
THE SKINNER CHUCK COMPANY
212 Edgewood Ave., New Britain, Conn.

THE CREST OF QUALITY

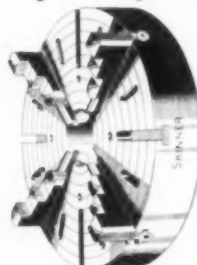


Chucks - Vises

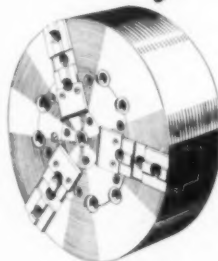
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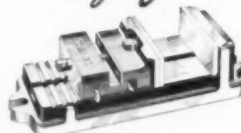
quality



accuracy



long life



positive grip



Hydraulic Press

A 50-ton hydraulic assembly press is now being manufactured by Turner Bros., Inc., 2625 Hilton Road, Ferndale, Mich. The press has been specifically designed for accurately maintaining center distances in assembling inner portions of fluid couplings.



The ram on the assembly press is set with an indicator, the stroke being electrically and hydraulically controlled so that the assembly of the members is accurately maintained. **T-5-1561**

Phosphating Cleaner

A solvent phosphating cleaner known as Solo-Phos (patent pending) is said to be a three-in-one cleaner. It removes grease and tar, cleans off chips and gives a rust-inhibitive phosphate coating. It was developed by the Whitfield Chemical Co., 14225 Schaefer Highway, Detroit 27.

Used for one-step cold cleaning and phosphating of ferrous metals, aluminum and zinc, it reacts with organic or metallic soils. It has a high solvency for oil, grease, and tar and the rust-inhibitive film formed on metal surfaces makes an ideal base for painting.

Solo-Phos can be applied in concentrated form by spraying, flushing, or dipping. Only standard equipment is necessary. After being allowed to react, it should be spray rinsed. Diluted solutions can be used hot or cold in tank or hand washing applications.

This cleaner was developed primarily to be used on parts where heat is not available. It will not attack rubber-tired wheels, painted or plated surfaces, and may be applied over plastic coated parts.

It is a viscous stable mild acid-solvent that is soluble in water. There is no disagreeable odor when applying the solvent, and its flash point is claimed to be above 200 degrees F.

T-5-1562

Chamfer Machine

Burr-Master model BM-2029 for chamfering and deburring flywheel ring gear is announced by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 4. The machine deburrs and chamfers all the teeth of a 14 inch diameter, 156-tooth flywheel ring gear in only 8 seconds cutting time.

The gear is loaded into the machine by slipping it over three rolls on the fixture, and into mesh with a drive gear. A locating finger, moving with the cutting tools, automatically locates the gear teeth radially on each stroke of the form-type cutting tools, thus compensating for any out-of-round condition or flatness variation.



With the drive gear indexing continuously, chamfering begins as soon as the gear to be cut is meshed with it. A combination rocker arm motion actuates the form tools to provide a generated cutting action, which enables the tools to chamfer and deburr all tooth edges well around the root of the gear tooth, leaving a burrless chamfered surface. Depth of cut is readily adjustable.

When cutting cycle is complete, a cycle indicator light signals that the gear is ready for removal. The operator depresses a lever to eject the gear by lifting it up and out of mesh with the drive gear.

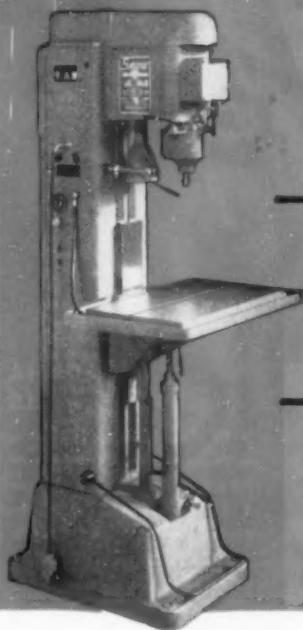
The machine base is of fabricated rolled-edge box construction for maximum strength and rigidity with minimum weight. Head frame is of alloy cast iron. Design features include special alloy bronze rocker arms, an overload clutch that prevents damage to machine parts in the event of accidental overloads and a precision indexing mechanism operating in a bath of oil. All wear parts are hardened and ground. All electrical equipment is designed to JIC standards. T-5-1571

Never Before

SO MANY ADVANTAGES for HIGHEST PRODUCTION

4800 PER HOUR! 3800 PER HOUR! 2500 PER HOUR!

*For Top
Production*



SNOW

FULL UNIVERSAL MACHINES

Air operated, electrically controlled Snow tools are establishing amazing production records daily on a wide variety of work. Just note these typical examples:

DRILLING

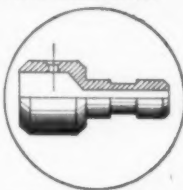
Crossdrill and C" T" Sink 1/16" Hole

Material—Brass

Production—4800 per hour

Fixture—# 15 Vertical index

Equipment—# 1-UD Drilling Machine



TAPPING

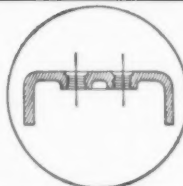
Tap Two #10-32 Holes

Material—Steel stamping

Production—3800 tapped holes per hour

Fixture—# 14 horizontal index

Equipment—# 1-UT tapping machine



THREADING

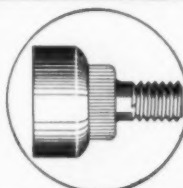
3/8"—24 Thread—1/2" Long

Material—Die Cast Aluminum

Production—2500 per hour

Fixture—# 10 Drum dial

Equipment—# 3-TR Threading machine



SNOW

MANUFACTURING COMPANY

435 Eastern Ave., Bellwood, Illinois
(Chicago Suburb)

Single Spindle Verticals • Two-Spindle Verticals • Two-Spindle Horizontals • Automatic Nut Tapping Machines • Automatic Heads • Automatic & Semi-Automatic Jigs & Fixtures

Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures. All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production. Sensitivity of power application prevents tool breakage.

Simplicity of control means that set up and operation can be handled by a less experienced operator with minimum fatigue.

Submit Sample Parts for Production & Cost Estimates

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-157

Technical Shorts...

SEVERAL METHODS may be used in coating sheet steel, each with an attendant disadvantage—usually that the precoat metal contaminates the molten aluminum bath during extended periods of operation, and which prevented large scale commercial adoption.

Another process, called Aldip, has been developed by General Motors Research. This patented method, which has been used successfully in commer-

cial operation for two years, was discussed in detail by D. K. Hanink and A. L. Boegehold at the annual meeting of SAE this year.

Operations involved include a preliminary cleaning of the metal in one of several ways, depending upon its original treatment (cast iron, cold rolled or cold finished or machined steel). It is then preheated, fluxed and aluminum-dipped. A molten salt bath for

preheating and fluxing steel is maintained between 1300 and 1325 F in an electrode furnace lined with special ceramic brick and containing molten aluminum at the bottom of the pot. A stirrer operates to maintain temperature by circulation of the hot salt at the metal and salt interface. The preheated and fluxed part can be dipped in either the molten aluminum beneath the salt, or transferred to a low frequency induction furnace containing aluminum. Dipping in this way causes an instantaneous and continuous coating regardless of steel cross-sectional thickness.

Excess aluminum is then removed, preferably in a salt rinse in the preheat flux followed by air blast, particularly at points where metal may accumulate.

Outline Control Factors

Engineers also investigated requirements controlling uniformity of the coated product, and also on the type of alloy produced as a result of subsequent treatment. Thus, they studied thickness of the intermediate iron-aluminum compound produced by different dip times in aluminum and also characteristics of the layer alloy resulting from diffusion at various temperatures. They found that the depth of alloy can be controlled as closely as by other metallurgical processes such as nitriding or carburizing. They also discovered that although depth of coating was affected by both the material used and time in dip, microhardness was seemingly unaffected. Extremely high hardness and brittleness were a fundamental characteristic of the compounds formed during immersion of steel; the compounds were found to contain about 55 percent aluminum.

Additions of silicon and beryllium to the dip metal lowered alloy hardness and increased ductility, but also lessened corrosion resistance.

There was a decided correlation between dip time and diffusion for the various steels. Thus research indicated a control factor that could be predetermined, and a desired case depth could be achieved through a given dip time at a given temperature.

* * *

A RECENTLY instituted monthly services is available to persons in the iron and steel, metalworking and related industries. Known as the *Curry List*, it is a listing of equipment (primarily used) available for delivery faster than new equipment. The list should provide a source of dependable equipment—covering such items as reduction units, cranes, shears, electric hoists and other machinery. The service, which is gratis, may be obtained from Albert Curry & Co., Inc., 941 Oliver Bldg., Pittsburg 22.

FOR YOUR SPECIAL AND STANDARD SPADE DRILL NEEDS

CHECK WITH WAUKESHA

WAUKESHA manufactures inserted blade stub spade drill heads equipped with coolant holes for large diameter and deep hole drilling. These heads can be mounted in your own extension holders to make up "special" tools at a saving. It will pay you well to stock Waukesha stub heads for your special uses.

WAUKESHA standard length spade drill holders are also available from stock. Both types are available in special diameters and lengths, with special shanks or flange mounts. They are also widely used for chamfering, spot facing and forming.

CONSULT WAUKESHA ON YOUR REAMING, BORING AND OTHER CUTTING TOOL PROBLEMS.

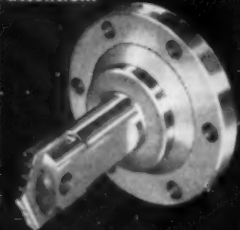


High-speed, heavy-duty adjustable reamers of all types.



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SEND for your free copy of the new Waukesha quick reference catalog. Gives complete specifications of all standard tools and prices.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-158

AN ECONOMY tip regarding stainless steel is offered by the Pfaudler Co. It has found this critical metal can go twice as far with "dimples". The company, which manufactures high pressure processing vessels for the chemical and food industries, has instituted a practice of punching cup-shaped indentations into the sheet stainless steel. Then bottoms are punched out, the jacket sheet placed around the processing vessel and welds made around each hole. According to Robert G. Chapman, chief engineer, the resultant jacket can withstand pressures up to 450 psi generated by the heating or cooling mediums such as steam, brine and freon, or ammonia, all common to Pfaudler's consumer field.

Prior to development of the dimpling technique, solid stainless steel of very heavy gage was required; a particular handicap since stainless contains scarce alloy materials such as chromium, nickel and molybdenum.

* * *

A RUBBER putty, called Plastikon, is said to be watertight, airtight and does not become brittle is being marketed by The B. F. Goodrich Co. Its developers recommend it for all purpose glazing and sealing of wood, glass, metal and stone. Prime advantages which they point out are its permanent pliability, ability to withstand vibration, expansion and contraction, extremes in temperatures, and resistance to corrosive fumes.

* * *

NAVY TECHNICAL NEWS bulletin for April describes a new "soft" magnetic material composed of noncritical metals which has recently been developed by the Naval Ordnance Laboratory. It is called 16-Alfenol and is composed of 16 percent aluminum and 84 percent iron. Although the alloy itself is not new, and was used fairly successfully during the war by the Japanese, it contains magnetic properties which should make it valuable in many applications. Supposedly its properties are superior to silicon iron, and may be especially useful in transformer cores such as commonly used in high frequency communications instruments.

* * *

THE SMALL DEFENSE Plants Administration, which has compiled numerous leaflets and bulletins has recently released another in its Technical Aids series aimed at the metalworking field. Listed No. 17, it covers "Taps and Dies", explaining techniques to aid in maintaining accuracy of thread cutting tools, and offering data calculated to prolong their useful life. It is available free from the SDPA field offices.

May, 1953

Try CLEVELAND Slotted-Type "Place Bolts"*

to solve vibration-point fastener problems



Find out about Place Bolts now! New users and new uses are multiplying daily. A cold-forged fastener made of either high carbon or alloy steel, the Place Bolt head brings *diaphragm spring action* to bear on seating surfaces while elastic elongation of the shank safeguards against loss of initial bolt-tension. Vibration-and-shock-proof holding power is assured. Sizes range from 1/4" diameter upwards, standard or special. Write today for our Place Bolt Folder.

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159

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A Darwin & Milner tool steel engineer will be glad to make suggestions that will result in better performance—greater economy wherever it is possible. Ask **now** for him to call!

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Good Reading

A GUIDE TO SIGNIFICANT BOOKS AND PAMPHLETS OF INTEREST TO TOOL ENGINEERS

ADVANCED MECHANICS OF MATERIALS by Fred B. Seely and James O. Smith. Second edition. Published by John Wiley and Sons, Inc., 440 Fourth Ave., N. Y. 16. Price, \$8.50. 680 pp.

Two new parts have been added to the original addition: The Influence of Small Inelastic Strains on the Load-Carrying Capacity of Members, and Introduction to Instability—Buckling Loads. Useful material not previously published has been presented in a number of topics throughout the book, and two new appendices have been added.

Where differential equations are involved in the analysis, their solutions are obtained, and the results, for a rather wide range of conditions, frequently are presented in the form of tables or curves. Numerical methods which are usually effective in the solution of differential equations for some combinations of physical conditions encountered in the analysis of this subject are not emphasized here.

The book is divided into six parts: Part I, preliminary considerations; Part II, special topics on the strength and stiffness of members subjected to static loads; Part III, significance of stress concentration in members of engineering machines and structures; Part IV, energy methods for determining the relationship between loads and deflections; Part V, inelastic behavior of load-resisting members; Part VI, buckling of thin-walled or slender members.

ELECTRICAL MEASUREMENTS MANUAL, by C. H. Dunn and H. J. Barker. Published by Prentice-Hall, Inc., 70 Fifth Ave., N. Y. Price, \$4.35. 112 pp.

This manual is intended for those tool engineers who do not have a basic education in electrical engineering. The first chapter of the book presents an extensive treatment of laboratory techniques for electrical measurements. The remainder of the volume is devoted to a well-balanced selection of laboratory experiments.

The experiments may be roughly divided into two categories: (1) the types and characteristics of basic electric instruments, and (2) the use of these instruments in the measurement of electrical and magnetic quantities. Experiments pertaining to circuit theory usually require measurement of electrical measurement.

HOW TO CONTROL PRODUCTION COSTS, by Phil Carroll. Published by McGraw-Hill Book Co., Inc., 1221 West 42nd St., N. Y. 36. Price, \$5.50. 127 pp.

This book is intended primarily for the management group outside of accounting. It will serve as a practical guide in explaining costs and points the way in the struggle to keep costs down and product quality up. It points out how to get more accurate product costs and how to control them. A new approach is taken in applying overhead expense in terms of conversion time and in accordance with rates caused by the different products in multiproduct industries.

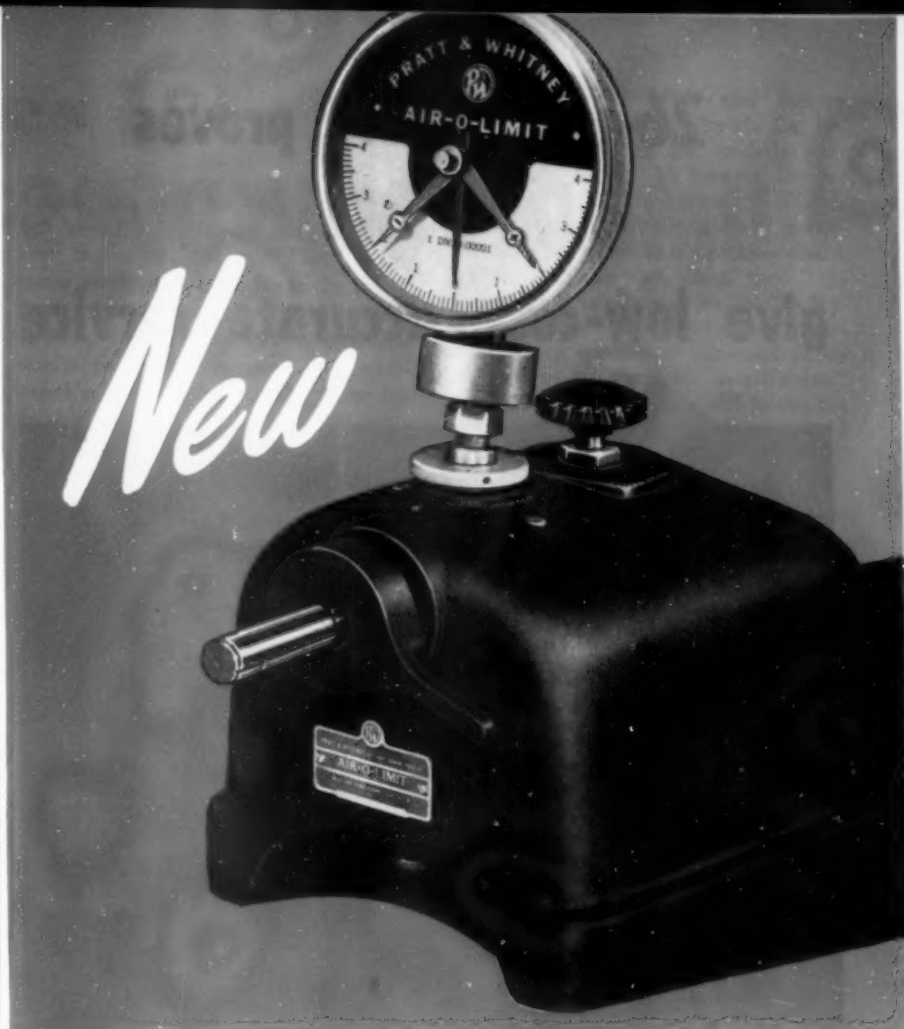
In showing step by step how to apply this effective control procedure, the author emphasized five factors: the importance of accurate sales forecasts; controlling production to know deliveries, reduce inventory and shorten the process-cycle; saving excess finishes and tolerances with realistic engineering; using incentives; and reporting results promptly.

INDUSTRIAL SAFETY AND HEALTH HANDBOOK, the Manufacturers Directory Co., Dept. 15-44, 1240 Ontario St., Cleveland 13. Price, \$25.

Every phase of industrial health and safety is covered in this handbook. The material is presented in nontechnical language. An indexing system enables the reader to quickly find pertinent references. Tabs and identifying labels separate subject matter into categorical groups. Included in the volume are such subjects as administration, protective equipment, mechanical safety, skin diseases, metal poisoning, airborne hazards, solvents, fire protection, radioactivity and housekeeping. The volume has an automatic binder that permits easy access to the material desired.

STANDARDS FOR TRAINING MACHINE TOOL DRAFTSMEN, National Machine Tool Builders' Association, 10525 Carnegie Ave., Cleveland 6. Price, \$1.50.

This report is a supplement to the Association's report on Apprentice Training Standards for Machinists issued in 1949. It includes a summary of standards for training machine tool draftsmen, and suggested forms of application for apprenticeship, apprenticeship agreement, conditions of apprenticeship, and quarterly apprentice report. It also contains a facsimile of a certificate issued upon completion of an accredited apprenticeship.



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How DUMORE insures high-speed internal grinding... mirror finish at low cost

PRODUCING drill chucks requires a difficult jaw grinding operation. Smooth finish and correct back taper are necessary. And each day, the grinder must withstand millions of hammer-like blows transmitted to the grinding wheel and spindle bearings.

Since 1927, this chuck manufacturer has used DUMORE precision grinders. Here is his report:

"Our Dumore No. 5 units operate 100 hrs. weekly to internal grind open jaws for our $\frac{1}{8}$ " to 1" plain bearing key type chucks. Material is 60 Rockwell C hardness alloy steel. We remove .005".

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CONTROL OF ELECTRIC MOTORS by Paisley B. Harwood. Third edition. Published by John Wiley and Sons, Inc., 440 Fourth Ave., N.Y. 16. Price \$7.50. 538 pp.

This third edition of a basic textbook on motor controls is a revised and expanded version which incorporates the latest developments and information available on the design, construction and application of these devices for all kinds of motors. It includes a great deal of new information on circuits, devices, and calculations used for the regulation of voltage, speed, tension, etc; numerous industrial applications; descriptions of electronic amplifiers, rotating regulators, and positioning servomechanisms; and basic principles of regulating problems.

Also included are new wiring diagrams and photographs, problems, and references.

The book is arranged entirely by motor types. Describing the design, construction, and application of controllers for electric motors, it begins with a general discussion of wiring diagrams, construction details, and pilot devices as applied to all kinds of motor control. The book is then divided into two sections, one for a-c motors and one for d-c motors, along with the associated controls. It covers completely the operation, characteristics, and application of each motor, the methods used to control it, and the actual design of the various types of control for that particular motor.

METAL DATA by S. L. Hoyt, Second Edition. Published by Reinhold Publishing Corp., 330 West 42nd St., N.Y. 18. Price, \$10. 526 pp.

The original purpose of the book has been carried over in this second edition: to select important data from reliable sources, and to present them to metallurgists and engineers in a form usable for daily reference. The bulk of the material is offered in tabular form with a minimum of text. Nearly 700 tables and graphs are included for working information on such metallic properties as tensile strength, hardenability, thermal expansion, creep strength, endurance limit and yield strength at normal, subnormal and elevated temperatures, and for conditions of mechanical treatment.

Special features include a listing of commonly used test bars, hardness tests, corrosion data, conversion factors, applications of materials and the properties of elements. New data is included on such topics as hardenability of H-steels, the recently developed super alloys for high-temperature stress members and other new alloys.

Field Notes . . .

A rolling mill for the fabrication of tapered aluminum alloy plates and sheets is under way for Hydropress, Inc. Company announcement describes the facility as a new type and will permit hot or cold rolling of aluminum alloy sheets from 0.032 to 3.0 inches thick. The 145-inch four-high rolling mill, believed to be the largest installation of its kind, is scheduled for operation late this year.

The JIC line of hydraulic accessories for machine tools formerly made and in process of development by Hydraulic Div. of Sundstrand Machine Tool Co., has been purchased in its entirety by The Parker Appliance Co. The line included all pumps and valves and special hydraulic units, according to S. B. Taylor, president of the purchasing firm. Bruce F. Olson, Sundstrand's president, pointed out that this does not affect his company's production of hydraulic products for other uses nor its production of oil burner fuel units. At the same time, he said that it will enable the firm to proceed with its policy of product diversification and concentration on specialized mobile equipment hydraulics.

Contract for a large, modern steel warehouse and offices has been awarded by Solar Steel Corp. to be erected on 20 acres of land on Reading Rd. in the Sharonville section of Cincinnati. The warehouse, which will serve central and southern Ohio, Indiana and Kentucky, will replace Solar's present Cincinnati plant. Plans for the facility include 50,000 sq feet for steel storage and processing, overhead cranes to transport materials about the plant, a private siding to simplify receiving and deliveries. A complete line of flat rolled and bar and tube steel products will be carried at the plant as well as high speed processing equipment. Operations are scheduled to begin from the plan in the fourth quarter of 1953.

A note of caution was inserted in the news attendant to the recent termination of government price controls. The Office of Price Stabilization in announcing final lifting pointed out that business firms need not make or keep records on future transactions, but must keep available for inspection whatever records were required by the regulations under which they formerly operated. Though the period may be shorter for certain records for certain businesses, records in general must be retained until April 30, 1955.

Acquisition of a building at 1119 E. Ten Mile Rd. in Hazel Park, Mich. has been made by Michigan Tool Co. to house production facilities of its newly formed Shear-Speed Chemical Products division. The building will be used primarily for final processing, and additional warehouse and storage space for finished materials is slated for acquisition as necessary.

Construction of office and factory buildings for Reuland Electric Co. begins this spring on the recently purchased site on U.S. 16 between Detroit and Lansing, Mich. Howard Reuland, president of the Alhambra, Calif. manufacturing firm, said in his announcement of the purchase and plans, that "this expansion program will be able to better tailor our manufacturing and sales engineering services to the exact needs of users of our products, in all areas."

The eastern operations will be headed by A. G. Fournier, who has been general sales manager since 1944.



- Completely Self-Contained Motor Driven Units
- No Set-Up Time — No Special Equipment
- Just Plug Into Nearest Electric Outlet

Especially designed for fast, precision Cycle Milling and Indexing—Continuous Face Milling—Cam Milling—Other special purpose jobs that require an Automatic Revolving Fixture. An exceptional time and labor saver!

20" MODEL: 18 quick-feed changes, 1½" to 52", or 3" to 108"

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TITLE

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A branch office of Westinghouse Electric Corp. has been established in San Francisco in line with national changes in the company's district organization pattern. Harrold G. Rethmeyer, who was formerly district manager of marine, aviation and transportation sales, will head the office.

Another announcement of expansion in the industry concerned the opening of Precision Diamond Tool Co.'s new manufacturing plant, a quarter of a mile east of Elgin, Ill. on U.S. 20. According to Jan Taeyaerts, president of the firm, the facility, which provides

two and a half times the floor space previously available, includes the latest in equipment for manufacture and quality control.

A combination of district and branch office territories of Denver, Salt Lake City, Phoenix, El Paso and Spokane into the Rocky Mountain Region with headquarters at Denver has been announced for Allis-Chalmers Mfg. Co. by C. W. Schweers, vice-president and director of sales of its general machinery division. Richard D. Moody, manager of the Los Angeles office since 1950, will be manager of the new region.

An intensive two-weeks course for factory managers, foremen, industrial engineers methods and time-study analysts, costs accountants and office executives is being offered by the College of Engineering at the State University of Iowa. Dates for the seminar are June 15 through June 27. Several of the work phases to be studied are production planning, motion and time study, plant layout, materials handling and quality control. The schools regular teaching staff will be augmented by outstanding men in both the industrial field and other educational institutions.

More information is available from Wayne Deegan, 113 Engineering Bldg., State University of Iowa, Iowa City.

Saves up to 60% Labor!

PIONEER 921-T CAST ALUMINUM TOOLING PLATE

It's free-machining, and easy to cut or rout. It will not creep or distort in machining because Pioneer Plate is precision cast with a fine, dense grain structure. No galling or drag during fabrication. You can cut it with high-speed equipment and save up to 60% in time.

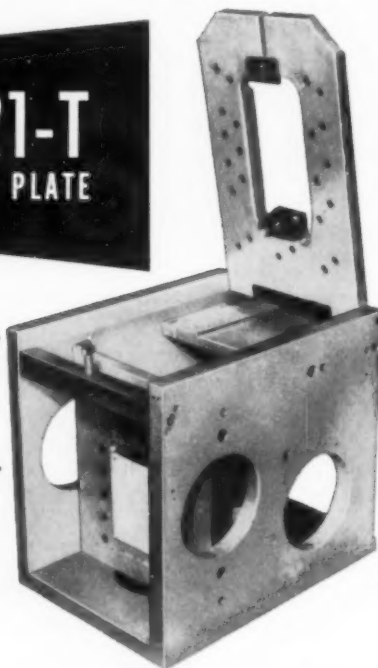
Easy-to-handle Pioneer 921-T Tooling Plate is produced with no internal shrinks or voids.

Atmospheric conditions do not affect it. Machined to plus/minus .005 with a 32 Micro-Inch finish both sides. Standard lengths are 96" and 144" ... 48" widths. Send for literature and name of nearest distributor.

Cuts machining costs on:

Drill Jigs
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Brake Dies
Form Dies

Assembly Jigs
Welding Fixtures
Hydro Form Blocks
Stretch Form Dies



Light weight, easy-to-load box drill jig made of cast aluminum. Hole patterns will not distort with temperature changes.

At a recent meeting, the stockholders voted to change the name of the Independent Pneumatic Tool Co. to Thor Power Tool Co. Reason given for the change is that the former name is no longer adequately descriptive of all their products. The trade mark "Thor" has long been identified with the company's products.

A Directory of Independent Tool and Die Manufacturers, has been published by the Office of Small Business, National Production Authority. The first of its kind ever compiled, the booklet lists some 1500 producers of special dies, molds, jigs, fixtures, gages, machines and related services. It is intended to facilitate the use of available producers of such equipment and expedite production for defense and defense-supporting requirements, and it is arranged to show, by symbols, types of tools and services each manufacturer can furnish, and the location and size of his plant.

Material for the directory was gathered by National Tool & Die Manufacturers Assn. It may be purchased from U.S. Department of Commerce, Div. of Printing Service, Distribution Section, Washington 25, D.C. 25¢.

Clearing Machine Corp. was host to press users who met recently for the 1953 Joint Industry Conference on Punch Press Standardization. Engineers and technicians representing both users and suppliers of press equipment were conducted on tours of the plant and shown the facilities and methods used in production by Clearing.

Function of the group has been to aid those concerns using high production methods by developing standards covering die space, bed and slide areas and other dimensions of mechanical presses that affect the ability of the user to interchange dies between presses of like tonnage capacity and die space areas. Business at this meeting included discussion of standards for four types of gap frame presses.



PIONEER TOOL ENGINEERING, INC.
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Detroit Stamping Co. has opened an additional assembly plant in Birmingham, Mich., devoted to manufacture and packaging of its line of production work holding tools. According to the announcement, the modern plant is equipped with the newest machinery and manned specifically for producing toggle clamps. The main office, still located in Detroit, manufactures specialized pressed metal parts as well as finished products.

The Swedish Gage Co. and its division, the C. E. Johanson Gage Co., have moved into their new building at 10641 Haggerty Ave., Dearborn, Mich. The building, which provides three times the size of their former home, includes not only office and manufacturing space, but an instrument assembly room, a gage block room, inspection room and lap room.

Creation of another engineering organization in the metal stamping field has just been announced. The new company, to be located in Monroe, Mich., will be known as **The Leake Engineering Co.**, and will operate as an entirely separate unit from **The Leake Stamping Co.**, also of that city. The company is described as providing complete service from design through every phase of production to the ultimate product. It also is equipped to supervise placement of stampings or dies and their tryout.

A corporate name change has been announced by **Industrial Equipment Co.**, 315 N. Ada St., Chicago. The firm now will be known as **Industrial Crane & Hoist Corp.** Reason for the change is that the new name better identifies the company with the cranes, runways and hoists that it engineers and makes.

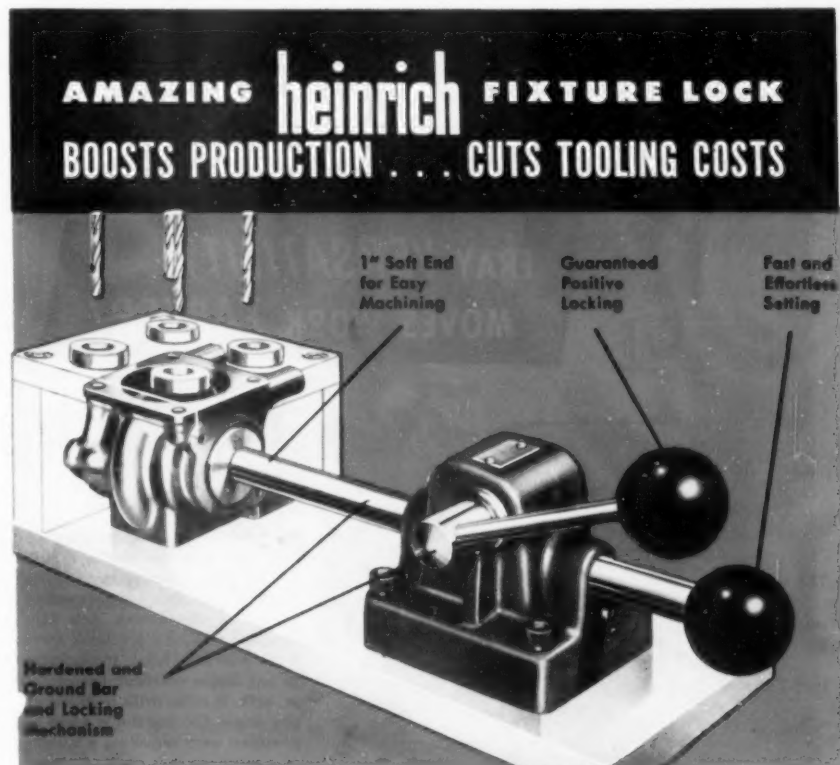
A separate division has been formed by **Michigan Tool Co.** to manufacture and market a line of industrial chemical products which have been under development by the company for the past several years. The division, to be known as **Shear-Speed Chemical Products Div.**, will have headquarters and sales offices in Detroit at 7125 E. McNichols Rd. In addition, a factory building has been acquired in the same city, and installation of equipment is under way.

Twenty-six years' experience will go with **Donald E. Hawkinson** to his new appointment as sales manager of the special machine tool department of **Greenlee Bros. & Co.** He has been with the sales department since 1947. At the same time of this announcement, **Greenlee** named **E. C. Van Tiem**, for 17 years a sales engineer in the Detroit office, to manager of that office. He succeeds **John M. Macrae** who died recently.

Two assistant managers have been named in branch offices of **Crucible Steel Co. of America**. **M. G. Brown**, who has been with the firm since 1936, and most recently tool steel sales supervisor at Cleveland, joins the Los Angeles branch. Active in the technical field, Mr. Brown also is a member of **ASTE**. At the same time, **Richard L. Roberson** becomes assistant manager of the Indianapolis branch. A native of that city, Mr. Roberson has been with **Crucible Steel** for the past 12 years serving in the position of office manager and sales service engineer.

James E. Drylie has been named as assistant sales manager of **Guibert Steel Co.**, in charge of its "Sup-R-Guy" products division. In his new position, Mr. Drylie will head sales, service and promotional development. He has been associated with **Guibert** for the past five years.

A New York regional manager has been appointed by **Lamson Corp.** **Gifford Kittredge**, formerly a field engineer in the Chicago region, will head the New York, Philadelphia and Baltimore districts.

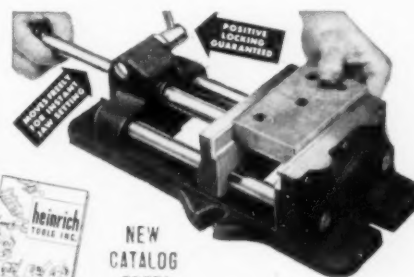


The famous Heinrich patented "Circle-Grip" locking mechanism . . . the same screwless, positive locking design proved in more than eight years of industrial use . . . is now available as the Heinrich "Grip-Master" Fixture Lock. Applicable for all types of

drilling, milling operations, etc. Eliminates special locking details; simplifies jig and fixture designing; wide work clearance; no screw threads to wear out. Ask your Dealer to demonstrate it.

HEINRICH "GRIP-MASTER" SCREWLESS VISE ALSO USED AS FIXTURE BASE STRUCTURE

Enjoy savings up to 75% on tooling costs using "Grip-Master" Screwless Drill Press Vises. Instant action; just a press on locking lever and "Circle-Grip" mechanism provides a hold that hammer blows cannot break! Hardened, precision ground for long service.



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Drill Press Vises • Fixture Locks • Nibblers • Punches • Rod Cutters

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North East West South IN INDUSTRY

Election of **August B. Hoefer** as vice-president of **Udylite Corp.**, and vice-president and general manager of **Frederic B. Stevens, Inc.**, wholly owned subsidiary of Udylite, has been announced by **L. K. Lindahl**, president of the corporation. Mr. Hoefer has been active in the firm since 1929.

A. F. Wiest has been placed in charge of all manufacturing operations for **Carpenter Steel Co.'s Alloy Tube Div.** Mr. Wiest has been connected with the company since 1929 after having previously been associated with other tube companies.

Armand A. Probeck has been elected vice-president of **Snap-Tite, Inc.** according to a recent announcement by **Malcolm S. Clark**, president of the company. Mr. Probeck is well-known in the metals industry, having maintained offices as **A. A. Probeck & Co.** in the east.

Two men have been named to **Evans Products Co.'s** top production staff. **Oscar A. Pratt** is now production control manager, and **F. H. Harl** becomes superintendent of main plant production. Both men bring to Evans a vast experience in their respective fields.

According to recent announcement, **Chester H. Kimmel** has been made vice-president and general manager of **The Ohio Crankshaft Co.** Mr. Kimmel has been associated with Ohio Crankshaft since 1940 when he joined the Crankshaft and Camshaft Div. as factory manager. He later was made general manager of that division and in May of last year was elected a vice-president.

G. M. Stickell has been named general manager of the **Landis Machine Co.**, while continuing to serve in the position of vice-president which he has held since 1942. In the new capacity, he succeeds **J. H. Elliott**, who formerly served as president and general manager and now will continue as president of the company.



G. M. Stickell



W. I. Senger

The **Gisholt Machine Co.** has announced the election of **Werner I. Senger** to the newly created position of vice-president in charge of balancing. Mr. Senger, who has been with Gisholt for more than 35 years, has been in charge of balancing machine development and engineering since 1924, and is recognized as among the world's leading authorities on the subject.

W. H. Roberts has been elected vice-president and secretary of **Detroit Stamping Co.** succeeding **John Beck** and **H. G. Roberts**, who have been serving as these respective officers in a semi-active capacity in recent years. Mr. Roberts, who is a member of the board of directors, has been with the company for the past 15 years, serving in various capacities in the administrative department. He was made manager of the Finished Products Division in 1945.

C. I. Burdick has been named director of industrial engineering at **Willy's Overland Motors, Inc.** In this position, he will be in charge of engineering material handling and packaging, facilities development, plant layout and plant engineering. Mr. Burdick was previously associated with **Dana Corp.** as a staff engineer.

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VERTICAL & HORIZONTAL

MILLING MACHINE

Speed up production by cutting job transfers with the versatile Fray 10-RH. This all-purpose milling machine performs an unequalled range of operations, cuts idle machine time and produces more work per man hour. It machines at any angle—vertical, horizontal or both. It mills, drills or bores at any angle. On any single piece of precision work requiring a variety of operations it is easier to reset the Fray than to transfer the work. For faster jobs, done better at less cost—investigate the easy to operate Fray 10-RH. A High Precision Tool.

FRAY "ALL-ANGLE" HEAD TYPE 4

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Overall Height 7'

Write for Details and Specifications
Bulletin 10

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Myron S. Curtis, who for the past four and a half years has served as director of engineering of **Warner & Swasey Co.**, has been elected engineering vice-president. Prior to his being made director of engineering and a member of the board of directors in 1948, he had served as assistant director of engineering, and also as a member of the planning committee charged with guiding the company's investigation and development of new products.

According to recent announcement, **Edwin H. Walker** has been named president and general manager of **McKinnon Industries, Ltd.**, subsidiary of **General Motors Corp.** in St. Catharines, Ontario. He succeeds **Thomas J. Cook** who is retiring after 10 years as president and general manager of McKinnon. Mr. Walker has been assistant to Mr. Cook since December 1, 1951.

Avildsen Tools and Machines, Inc. has elected **Milton A. Gordon** to its board of directors. Until recently Mr. Gordon was vice-president of **Walter E. Heller & Co.**, financial firm. In his new post, Mr. Gordon will advise the board on financial matters and participate with management in formulating expansion plans.

OBITUARIES

Charles B. Bohn, chairman of the board of **Bohn Aluminum & Brass Corp.**, died recently in a Miami Beach hospital of pneumonia. He was 73 years of age. Mr. Bohn had been active in the aluminum field since at the age of 20 he with three companions, started their own company when with a combined savings of \$2,500 they bought the foundry of the company where he had been working. They named it the Allyn Brass Foundry Co., but took only enough brass work to finance their work in aluminum. In 1918 he organized the Charles B. Bohn Foundry and six years later merged with General Aluminum & Brass Mfg. Co. to form the firm whose board he headed at the time of his death.

Jacob C. Cox, who had been president of **The Cleveland Twist Drill Co.**, from 1919 until last November when he became chairman of the board, died recently at the age of 71.

Mr. Cox took an active business part in the company founded by his father. Employee relations occupied much of his attention, and his book, "The Economic Basis of Fair Wages", has been widely quoted. He pioneered in-

stallation of one of the first profit-sharing plans in 1915 to implement his belief that the interests of owners and employees of a business were mutual. Mr. Cox was a past president of the National Metal Trades Assn. and a director and past president of the Associated Industries of Cleveland.

Richard Knight LeBlond, founder and chairman of the board of **The R. K. LeBlond Machine Tool Co.** died recently after an illness of several months. He was 88 years old. A pioneer in the field, he was an active participant in company affairs as chairman up to the time of his illness when he had completed 66 years as head of the company he founded. He remained in the office of president until 12 years ago when he was succeeded by a son, Richard E.

After various apprenticeships and night attendance at Washington University, Mr. LeBlond started his business with three employees in 1887. He specialized in manufacture of printing type molds, gages and small tools connected with the type making industry. Four years later arrangements were made to build lathes and lathe attachments for another Cincinnati concern, thus starting the company's machine tool career. Two years before the turn of the century, the company was incorporated under its present name.

Mr. LeBlond was a charter member of the National Machine Tool Builders' Assn., working closely with other machine tool builders to gain acceptance for many new ideas and methods which helped to make possible America's industrial growth.

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- Is 62 Rockwell C
- Contains metallic carbide formations for at least 18.5% extra wear resistance
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*See "Special American Machinist report to the metal working industries" © 1950 by McGraw Hill Publishing Co.

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Lathes

Manual S-104 covers installation, operation, lubrication of company's improved model LT Cintilathes; exploded views of parts and diagrams of equipment clarify text. Also includes exploded views and parts listings applying to older design lathes. Available to users; apply on official letterheads. **Cincinnati Lathe & Tool Co.**, Oakley, Cincinnati 9, Ohio. **L-5-1**

Thermocouples

Catalog No. 5 deals with thermocouples and other pyrometer supplies

pointing out efficiency and economy, contains complete data and illustrations. **Arklay S. Richards Co., Inc.**, Newton Highlands 61, Mass. **L-5-2**

Cylinders, Hydraulic

Extensive pertinent pressure and flow data, dimensional and specification information, and engineering drawings and photos of recently introduced line of high-pressure hydraulic cylinders presented in Folder 103 pointing out main features and advantages. **The S-P Manufacturing Corp.**, Cleveland, Ohio. **L-5-3**

Inserts, Carbide

Fifty-six page carbide catalog shows complete line of blanks, tools and tool-holder inserts; also contains 12 pages of technical information on carbide and its use. Each item is discussed with photograph, detailed line drawing to show dimensions and angles, descriptive caption, sketch to show applications and ordering information including prices. **Vascoloy-Ramet Corp.**, Waukegan, Ill. **L-5-4**

Oil, Lubricants, Etc.

Brochure, "Houghton Products Meeting Government Specifications," serves as reference for manufacturers whose contracts call for items to meet federal requirements. Company's products meeting various specifications are listed under these classifications: rust preventatives, lubricants, cutting oils, metal-working aids and leather and synthetic rubber products. Includes Government Preservative Compound Chart, based on MIL-P-116 A which contains descriptive and application details of P-1 to P-17 preservatives. **E. F. Houghton & Co.**, 303 W. Lehigh Ave., Philadelphia 33. **L-5-5**

Burner Tips

Folder, No. 526, presents details and specifications on standard Alco burner tips; covers physical characteristics for gas burner tips, radiant burner heads. Also gives detailed information on burner special order service for specialized burner tips and heads made to any design. **American Lava Corp.**, Chattanooga 5, Tenn. **L-5-6**

Cutting Tools

Revised catalog No. 87, aimed at simplifying the application and usage of cutting tools, contains extensive technical data; each tool is completely presented on a single or facing pages; new tap section includes recently introduced line of special purpose taps. Thumb-tab index facilitates quick reference. **Morse Twist Drill & Machine Co.**, New Bedford, Mass. **L-5-7**

Marking

Comprehensive 32-page catalog describes line of marking stamps and dies for industrial uses; includes dies and stamps of all types for hand or press with full illustration so that it may be used as reference book. **The Parker Stamp Works, Inc.**, 650 Franklin Ave., Hartford, Conn. **L-5-8**

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SOLID TUNGSTEN CARBIDE COMMUTATOR SLOTTING CUTTERS



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Rust Removal

Booklet discusses rust and tarnish removal by means of "six tailored types" of Rustlean; gives detailed instructions for their use, and outlines important features and advantages of product. **Octagon Process Inc.**, 15 Bank St., Staten Island 1, N.Y. **L-5-9**

Chucks

Circular, "Save Time by Eliminating Mechanical Clamping on Production Machining with Sundstrand Power-Grip Chucks," describes and pictures magnetic Power Grip equipment and explains its suitability for various milling and grinding operations. **Sundstrand Magnetic Products Div.**, Sundstrand Machine Tool Co., 1020 Ninth St., Rockford, Ill. **L-5-10**

Paper Work Copying

Complete booklet explains uses and advantages of Ozalid copying process stressing speed, efficiency and economy. Case histories present details of its use in specific departments and businesses; well illustrated. **Ozalid, Div. of General Aniline & Film Corp.**, Johnson City, N.Y. **L-5-11**

Gear Drives

Detailed information about single, double and triple reduction enclosed herringbone gear drives presented in 36-page book No. 2519; installation photographs show examples of the drives in various types of heavy duty service. Extensive tabulated data gives all pertinent statistical information; also gives complete instructions to insure correct selection. **Link-Belt Co.**, 307 N. Michigan Ave., Chicago 1. **L-5-12**

Tool Sharpening

Folder L22, "A Final Step in Tool Sharpening," explains how time, tools and materials are saved when cutting tools produce a consistent finish; why cutting tools often produce a non-consistent finish; what to do to obtain more consistent finish and more pieces per grind. **Micrometrical Mfg. Co.**, 445 S. Main St., Ann Arbor, Mich. **L-5-13**

Fasteners

Comprehensive catalog covers line of fasteners suited to applications to a wide variety of applications in industry. The 36-page piece carries an illustrated contents to simplify locating material; contains dimensional drawings, engineering data, installation details as well as numerous photos and drawings illustrating all points. **Simons Fastener Corp.**, N. Broadway, Albany 1, N.Y. **L-5-14**

Grinder

Catalog N-52 deals with Type DH crank pin grinder for precision grinding of crankshafts on a production basis; 45 illustrations and sketches show design details, typical applications and operating controls. **Landis Tool Co.**, Waynesboro, Pa. **L-5-16**

V-Belts

Eight-page illustrated brochure 3787 presents V-belts for industrial use, pointing out construction features and advantages of the line; simplified conversion tables allow user to determine

quickly the correct belt for any use; includes prices, dimensions, weights and other data. **Thermoid Co.**, 200 Whitehead Rd., Trenton, N.J. **L-5-17**

Notching

Fully illustrated, catalog N describes complete line of independent, self-contained notching units to notch mild steel up to $\frac{1}{4}$ inch thick; emphasizes wide flexibility setups in stamping presses and press brakes. Includes engineering drawings and specifications. **Wales-Strippit Corp.**, 345 Payne Ave., North Tonawanda, N.Y. **L-5-18**

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Who's Meeting - and Where

May 6-8. NATIONAL METAL TRADES ASSOCIATION. Middle Atlantic Assembly, Bellevue-Stratford Hotel, Philadelphia.

May 14-23. INTERNATIONAL PETROLEUM EXPOSITION. U. S. Bureau of Mines section of the Hall of Science, Tulsa, Okla.

May 17-28. GAUGE AND TOOL MAKERS' ASSOCIATION. Fourth Gauge and Tool Exhibition. New Hall, Westminster, London, England. Write Gilbert T. Beach, secretary, Standbrook House, Old Bond St., London, W.1, for details.

May 18-19. NATIONAL FLUID POWER ASSOCIATION. Meeting. Bedford Springs Hotel, Bedford, Pa. Get more information from temporary executive secretary, Barrett Rogers, 1618 Orrington Ave., Evanston, Ill.

May 18-20. METAL TREATING INSTITUTE. Annual spring meeting, Hotel Shamrock, Houston, Texas. Get full information from Institute offices, 271 North Ave., New Rochelle, N.Y.

May 18-22. NATIONAL MATERIALS HANDLING EXPOSITION; also three-day conference of American Material Handling Society. Convention Hall, Philadelphia. Details of both show and conference are available from Clapp & Poliak, Inc., 341 Madison Ave., New York 17.

May 18-22. ROCHESTER INSTITUTE OF TECHNOLOGY. Cam Design and Tool Selection Conference for single and multiple spindle automatic screw machines, to be held at the Institute, Rochester, N. Y. Inquire about details from Robert D. Pease, Associate Director, 65 Plymouth Ave. S., Rochester 8.

May 27-29. AMERICAN SOCIETY FOR QUALITY CONTROL. Seventh annual convention, Convention Hall and Benjamin Franklin Hotel, Philadelphia. Write national headquarters, room 5036, 70 E. 45th St., New York, for more data.

Dr. John Gaillard, mechanical engineer on the staff of the American Standards Association, will hold his next five-day seminar on industrial standardization the week of June 22 through 26. The sessions, consisting of ten conferences, will be held in the Engineering Societies Bldg., 29 W. 39th St., New York. The classes, which have become regularly scheduled, were started in 1947 at the request of companies for assistance in organization of standardization work. To date, more than 100 organizations have been represented. Contact Dr. Gaillard, 400 W. 118 St., New York 27, for details and registration.

The Tool Engineer

Abstracts of Foreign Literature

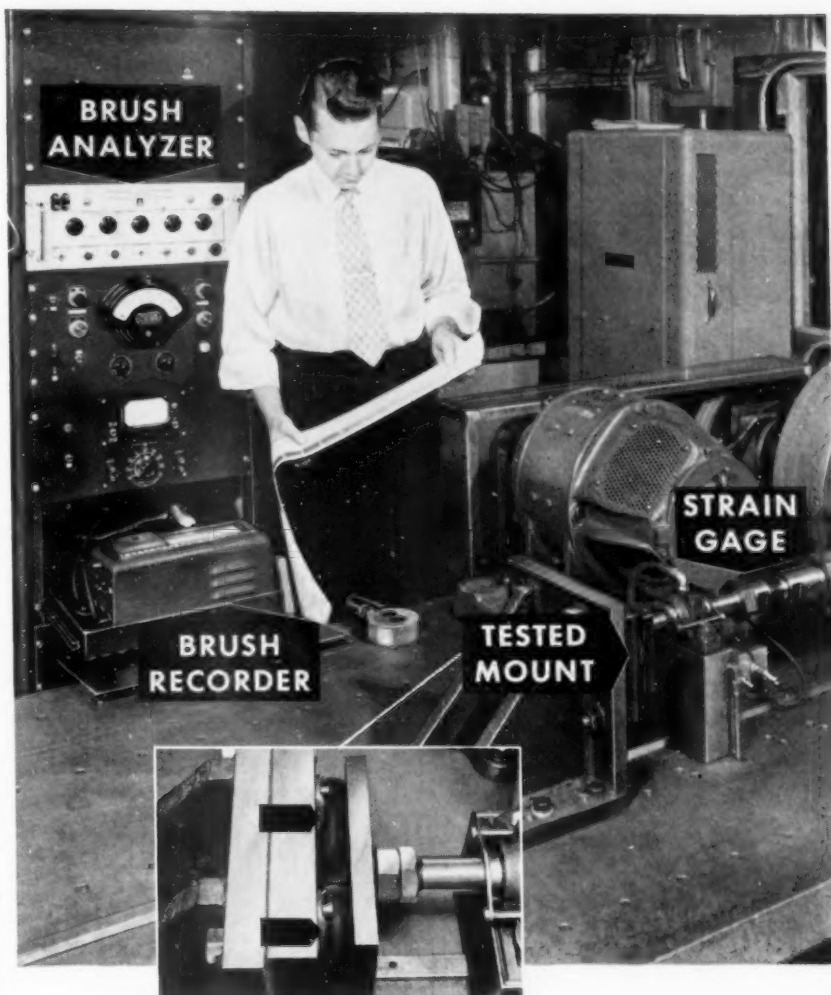
By M. Kronenberg

Grinding Research

Surface roughness in grinding operations has been investigated under sponsorship of the German Academy of Science (*Forschungsgemeinschaft der Deutschen Wissenschaft*) at the Institute of Technology of Aachen by E. Saljé, as reported in the February 1953 issue of *Werkstatt und Betrieb*.

This report is the first part of a research program covering the "Principles of the Grinding Process." Due to the fact that considerably more variables must be taken into consideration in grinding research than in other branches of metal-cutting research, it was found feasible to make use of dimensional analysis of the relationships involved in machinability as first suggested years ago by Kronenberg. E. Saljé indicates that he did not consider the individual grain of the grinding wheel as "the tool," but rather wanted to determine the factors which affect the depth of surface roughness and the grinding forces. The relationships could be formulated in the form of dimensionless quantities from which important conclusions were drawn and then rechecked by tests. In view of the fact that dimensionless quantities apply equally well to the inch system as to the metric system, they may be used without conversion here and abroad and in this way promote exchange of research findings. The author's paper covers the effect of the grinding wheel on the grinding process, the effect of coolants, the number of strokes, the relationship between work speed and wheel speed and the depth of cut. He included also the 'firing' of the wheel and its effect on improving surface finish, thereby he found that firing is useful only up to a certain limit of strokes.

The dimensionless quantities from which the surface roughness can be determined include thermal conductivity, specific heat, specific gravity, wheel-and-work velocities, depth of cut, feed and width of the wheel. The surface roughness decreases proportionally to the wheel speed and exponentially with the ratio of the width of the wheel to



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May, 1953

171

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130 Different Side Milling Cutters	40 Different Face Milling Cutters
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the feed. The article covers more than twelve printed pages and is illustrated by 33 diagrams and many tables with experimental data.

Tracer Controlled Milling Machine

A mechanical tracer device is employed in a recently developed milling machine, replacing hydraulically controlled tracer valves. The stylus is attached, according to an article by C. Stromberger in No. 10, 1952 of *Werkstatt und Betrieb* to a vertical ring. Inside this ring a horizontal shaft is eccentrically located to which three rolls are attached contacting the ring in different positions according to the requirements of the shape of the surface to be produced. A fourth roll supplies the pressure between ring and the other rolls. The kinematics of the relative motions of ring, rolls and shaft are described in the article and it is shown how the impulse given the stylus changes the motion of the shaft, which in turn controls an electronic device. Illustrations of workpieces produced indicate that any angle between 0 and 90 degrees can be milled, and that a good surface finish is produced. The machine can be equipped with two speed ranges, one covering speeds from 150 to 2900 rpm, the other one, from 3600 to 18,000 rpm.

International Committee for Machine-Tool Standardization

European tool engineers are substantially more "standardization-conscious" than we here in USA and problems associated with machine tool standards always have therefore found considerable attention abroad. Recently a new committee has been established and the French representative has been elected chairman, as indicated in *La Machine Moderne* of January 1953 by P. Salmon. The membership includes Belgium, Italy, Switzerland, Sweden, France, Spain, Portugal, Germany, England and USA.

The author writes that the French machine tool designers and manufacturers who have agreed to participate in the standardization of machine tools are well aware of the difficulties involved in this type of international co-operation. Two main categories of problems have been taken into consideration, namely, standardization of speeds and feeds and standardization of tolerances for acceptance tests. These topics have been assigned to numerous subcommittees, among which the "Subcommittee for Machine Tool Elements" encountered serious troubles due to different opinions existing in different countries. The problem of metric versus

such system entered here too. Among the items on which agreement has been reached as far as desirability of standardization is concerned are spindle noses for milling machines, spindle speeds and feed rates, grinding wheel mountings, and numerous others.

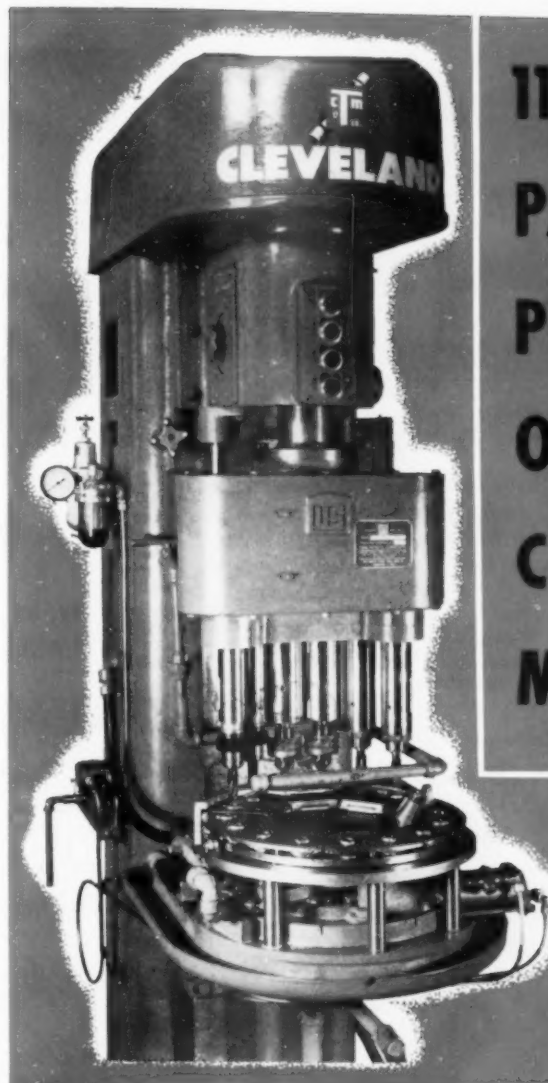
The author, who is the French Commissioner for Machine Tool Standardization, also indicates that The American Delegation was happily surprised to find on numerous occasions that the European engineers were equally as well informed as they and he expects that international cooperation between the two continents to progress faster than before.

Bernard P. Planner, metallurgical engineer and staff consultant for James H. Knapp Co., Inc., is compiling the results of a survey he has just made for his company in Western Germany where he studied post-war achievements and trends in the German metallurgical industry. Dr. Planner has served as consultant to the U. S. Army services of supply and Army intelligence and the industrial objectives division of the Board of Economic Warfare, as well as to several American industrial concerns.

A group of French technicians are touring the United States as part of under the sponsorship of Mutual Security Agency. Purpose of the visit is to acquaint the Frenchmen with American methods in the metal stamping and metal cutting industry. Recognizing the importance of French production to European defense and stability the Agency arranged a comprehensive itinerary for the team including visits to plants in Detroit (New York, Philadelphia and Chicago.

Typical of these tours was the one made through Clearing Machine Corp. There the team observed manufacturing methods and facilities for which turn out heavy mechanical hydraulic presses. Later the group was taken to the Budd Co., in Gary, Ind., to see the equipment in actual operation.

Exclusive distribution rights in the United States for the George Fisher line of patented lathe work drivers has been granted to The Skinner Chuck Co. The equipment is being sold through all of Skinner's present machinery and industrial supply distributors. According to the announcement of this business arrangement, Skinner has the right to manufacture complete work drivers, should George Fisher be unable to make delivery.



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Why? Because even if the work is out of alignment with the spindle by as much as 1/32" on the radius (1/16" on the diameter), the machine will still turn out perfect holes, the Ziegler Holder being so designed as to compensate automatically for the inaccuracy in set-up.

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... used for quick, accurate set ups like this ...



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Stud sets consist of 40 pieces and provide requirements for at least 4 clamps from 3" to 15" high with T nuts for your table slot.

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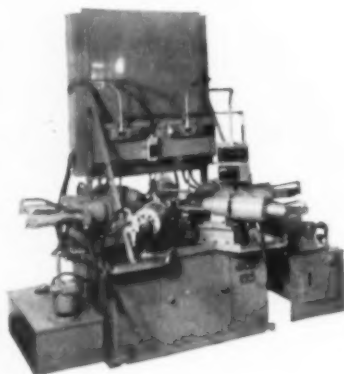
TOOL STEELS

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May, 1953

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175



New Machine Drills 3840 Holes Per Hour

EXCEPTIONALLY fast drilling of 32 holes (3/16" diam.) in a steel part is made possible by this new machine which incorporates 8 Model HH Govro-Nelson Automatic Drilling Units, electrically interlocked with automatic, hydraulically operated clamping and indexing.

In operation, the operator places the part on a fixture and presses the start-cycle switch. The part is automatically clamped and 8 holes are drilled simultaneously at each of the four indexes, thus completing the 32 holes. Then the part is automatically unclamped. Output rate: Approximately 120 parts (3840) holes per hour.

If you have similar operations and would like to speed up your production rate, send samples and parts prints and we shall be pleased to recommend the proper Automatic Units or quote on a complete set-up. Literature sent upon request.

**WRITE FOR
Literature**



GOVRO-NELSON CO.

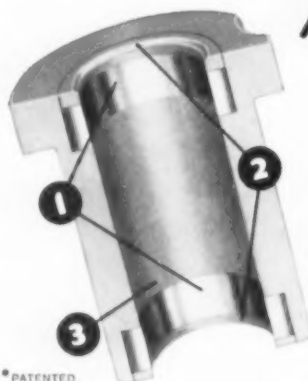
Machinists of Precision Parts for 30 Years

1933 ANTOINETTE

DETROIT 8, MICH.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-176-1

**MORE HOLES—
MORE ACCURACY—
FASTER—
AT LESS COST**



* PATENTED

1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for Meyco Bushing Catalog No. 13



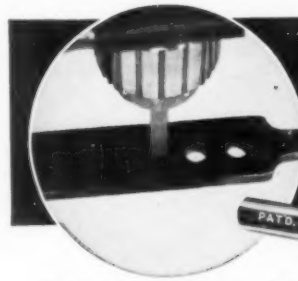
W. F. MEYERS CO., INC., BEDFORD, INDIANA

MEYCO
Carbide Inserted Bushings
Are Doing It Daily!

HOW? Like this: (1) Last longer... with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

USE READER SERVICE CARD; INDICATE A-5-176-2

Drill Hardened Steels without Annealing —



**USE
The New
IMPROVED
"HARDSTEEL"
DRILL**

With the new, improved "HARDSTEEL" Drill, you can do accurate, smooth drilling, countersinking, counterboring and reaming in steels hardened by any process without first annealing the work. And they work with equal ease on work-hardening steels and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" Drills fit standard drill presses. They save time and reduce rejects. They permit engineering changes requiring additional drilling after hardening. And parts drilled after hardening always match at assembly.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are cutting costs in thousands of plants.

**You Harden It—We'll Drill It—
With "HARDSTEEL"**

BLACK DRILL COMPANY, INC.
414 East 222nd St. • Cleveland 17, Ohio

Also makers of—
**BLACK DRILLING
UNITS—AUTOMATIC,
SELF-CONTAINED—
FOR COST-CUTTING
PRODUCTION ON
ALL MATERIALS**

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... for Precision and
Economy Production

- SPUR GEARS
- SPIRAL GEARS
- WORM GEARS
- WORMS
- BEVEL GEARS
- INTERNAL
THREADS



MIKRON

Universal GEAR HOBBER #102

Easy to set-up.
Easy to change-over
from job to job.
Simple to operate!

CAPACITY (standard machines)

Spur or spiral gears,
max. dia. 4 3/4"
Max. length of cut 5 1/8"
Number of teeth from 6 to 325
Lead of spirals from 3/4" to 174"
Angle of right or
left spiral. . from 0° to 90°
Max. pitch DP 12

RUSSELL, HOLBROOK & HENDERSON, INC.

292 Madison Avenue, New York 17, N. Y.

Carlton

Only one

*Carlton's exclusive 3-unit power-operated
mechanical clamping of arm, head and column
is easier, faster and costs less to operate*

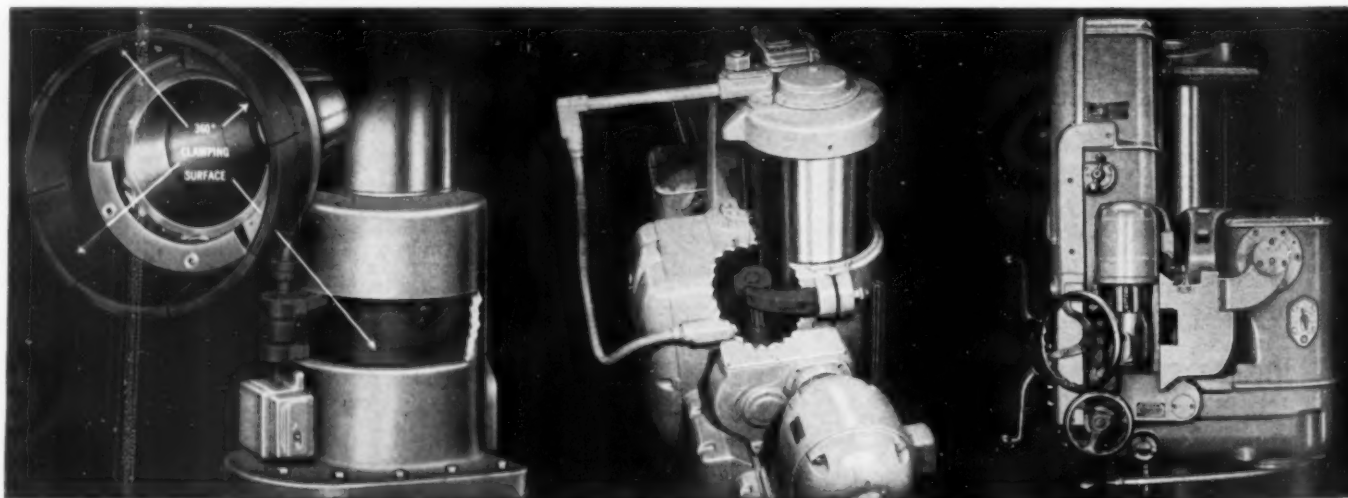
ELECTRO-HYDRAULIC POWER is used to actuate mechanical clamping devices on arm, head and column of Carlton radials. Once any of these units is clamped or unclamped, mechanical devices hold them in position until the electro-hydraulic power is applied again.

Electric power is used only when clamping or unclamping . . . results in noticeable savings in electric power consumption.

The hydraulic pressure required in Carlton electro-

hydraulic clamping systems is comparatively low . . . so that there is positively no leakage of oil from any unit. Each unit has its own individual oil reservoir . . . and the oil from the Arm reservoir is used to lubricate the Column.

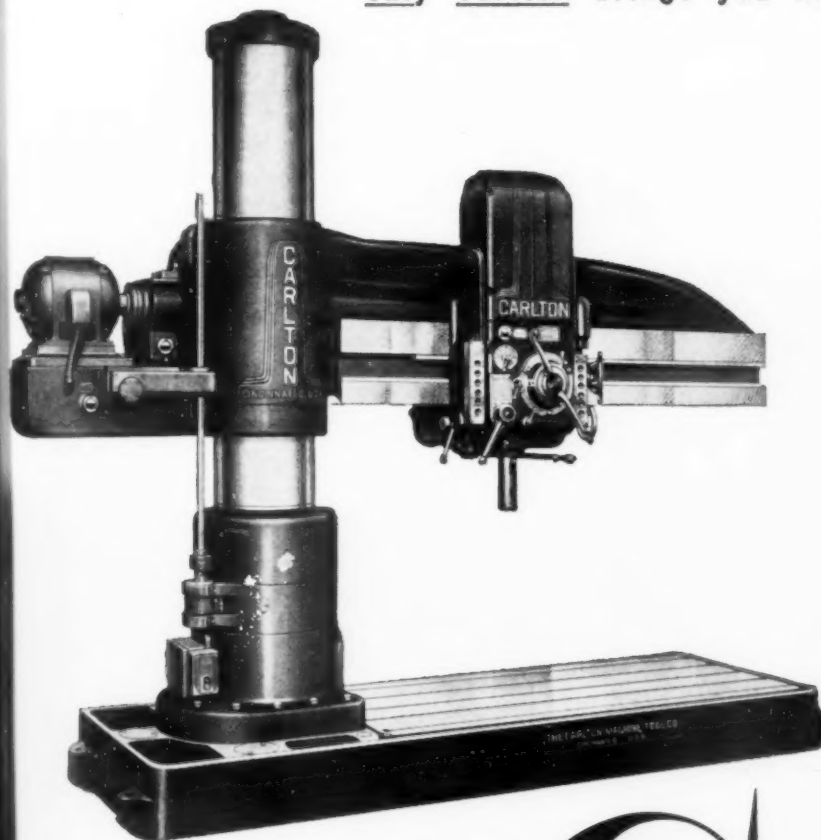
Due to the use of electrical interlocking, overload relays and safety valves, it is impossible to overload Carlton electro-hydraulic clamping systems either electrically or mechanically.



column clamp...arm clamp...head clamp

*can be called
the finest...*

only Carlton brings you all these radial drill advantages:



CENTRALIZED CONTROLS.

All controls necessary for quickly and accurately locating the drill from one hole to the next are centralized at the head . . . all located within the spread of a man's hand.

- **CENTRALIZED CONTROLS** (see above).
- **3-UNIT POWER CLAMPING:** column, arm, head (see opposite page).
- **LOW HUNG DRIVE** . . . drives on largest diameter of the spindle . . . permits maximum torque transmission with a minimum of spindle twist.
- **FREE AND EASY RUNNING** . . . thanks to the generous use of tapered and straight roller bearings and ball bearings.
- **EASY TO MAINTAIN** . . . parts jig machined for absolute interchangeability.
- **THE RIGHT RADIAL** for you: select your Carlton from among 5 models, 26 different arm and column sizes. Why not send for descriptive bulletins today?

Carlton

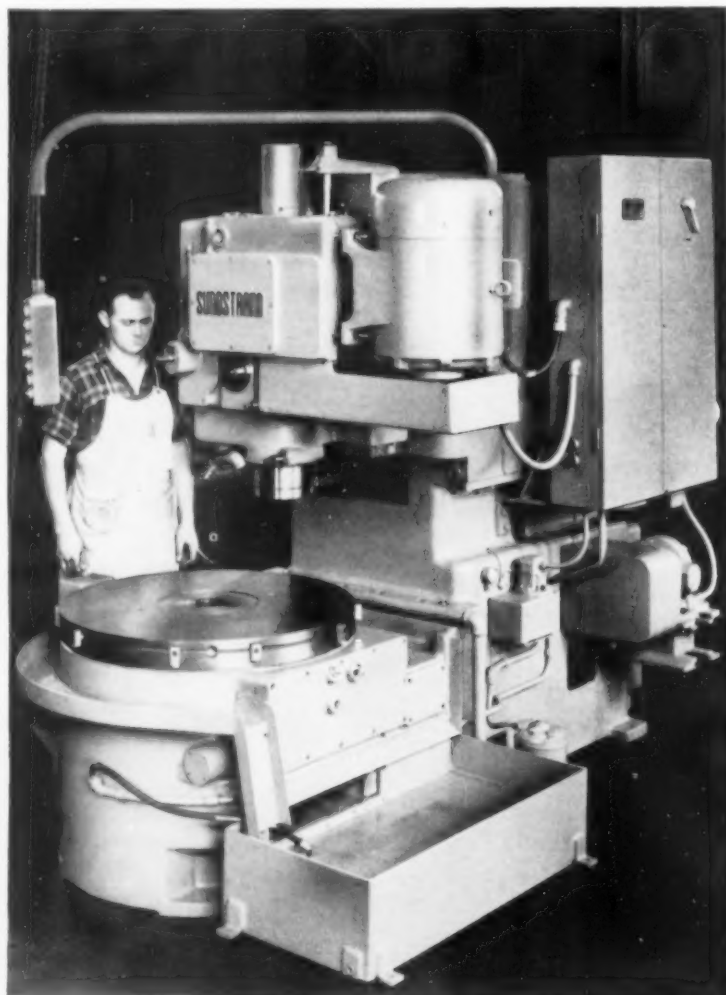


THE CARLTON MACHINE TOOL CO., CINCINNATI 25, OHIO

Check These Time Saving Possibilities of SUNDSTRAND Rotary Milling Machines

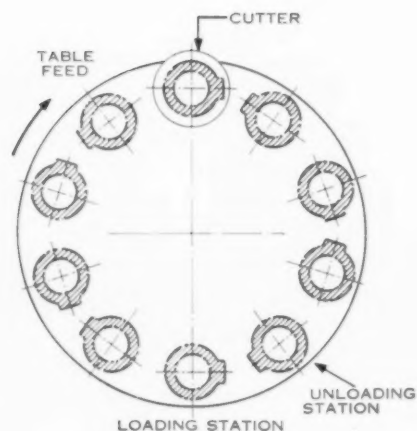
Sundstrand standard vertical rotary Rigidmil milling machines have many possibilities for solving production milling problems. They can be furnished with one or multiple spindles. In all cases loading and unloading time

is eliminated. Check into the possible application of a Rotary Rigidmil to your production milling. A Sundstrand engineer will be glad to help. There is no obligation for this service.



Single Spindle Applications

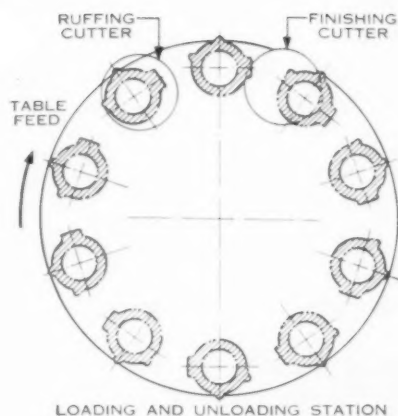
Photo and drawing to the left illustrate the design and operation of the single spindle machine. It is made in two sizes, 36" or 48" diameter rotary table. It has a 25 hp vertical head and can be furnished with either power or manual feed for cross positioning of the head carrier. Head is mounted on vertical ways for manual positioning. Machine can be provided with power elevating device for positioning of head or for automatic cutter retraction.



RIGIDMILS

• AUTOMATIC LATHES

• HYDRAULIC EQUIPMENT

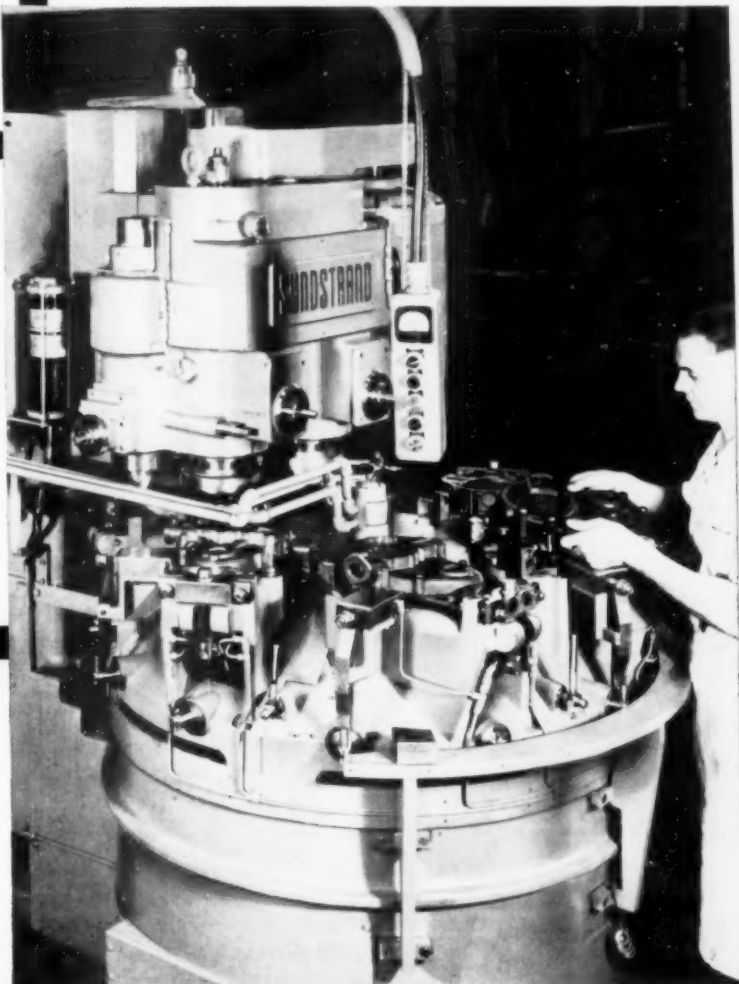
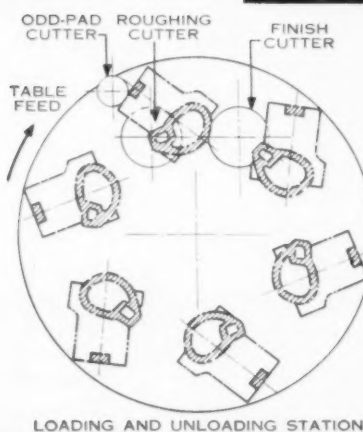


Two Spindle Applications

Basically the two spindle machine is the same as the single spindle rotary Rigidmil. The drawing to the left indicates how both rough and finish milling cuts can be made simultaneously. As in the case of all rotary Rigidmils, loading and unloading time is eliminated—operator loads and unloads while cuts are in progress.

Multiple Spindle Applications

Photo to the right illustrates a special tooling job on a 3 spindle rotary Rigidmil. In this installation, one cutter rough mills the large pad, a second cutter finish mills this same pad, and the third cutter takes one cut on a small pad at a different depth—all with one clamping of the part. As in the other applications, operator merely loads and unloads the workpiece. Machines with four or more spindles can be supplied to meet the requirements of the job.



**FREE
DATA**

is available on Sundstrand Rotary Rigidmils or other time saving Sundstrand milling machines. Ask for bulletin 731.



**SUNDSTRAND
Machine Tool Company**

2540 Eleventh St. Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES

SPECIAL MILLING AND TURNING MACHINES

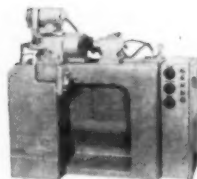
bryant

internal grinding



no. 1309-W

Finishes 2 bores and a taper straight and concentric. 2 wheelheads are used on this semi-automatic. Max. traverse stroke, 6". Max. grinding length, 3½".



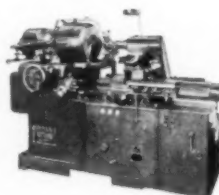
no. 1109

For high production of small bores where accuracy of size and finish are required. Max. traverse stroke, 6". Max. grinding length, 3½".



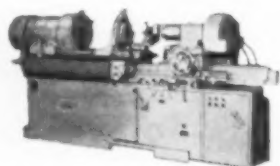
no. 2209

For precision and high production grinding of ball bearing races, gears, rolls, bushings, etc. Max. traverse stroke, 6". Max. grinding length, ¾".



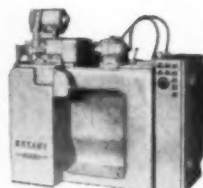
no. 1116

A general purpose hole grinder for tool room, small shop, or general production. Maximum traverse stroke, 20". Maximum grinding length, 8".



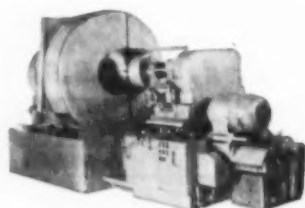
no. 1416

Specially designed for grinding bores in long work, such as machine tool spindles. Maximum traverse stroke, 20". Maximum grinding length, 8".



no. 1209

A fully automatic, high production machine for small and medium bore grinding. Max. traverse stroke, 6". Max. grinding length, 3".

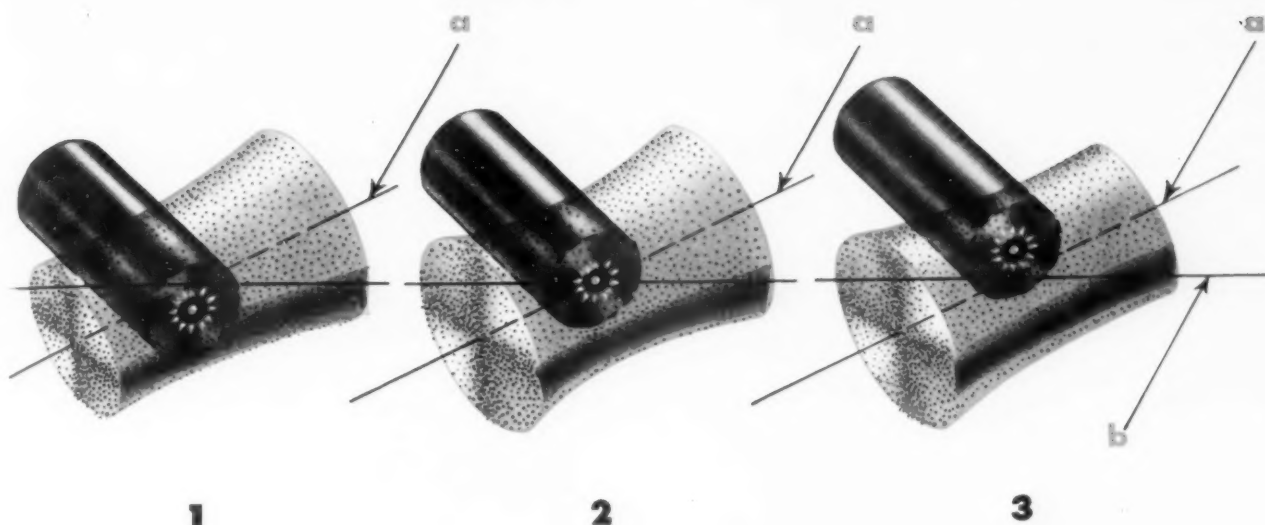


no. 1460

For production or single piece hole grinding on parts up to 60" diameter. Max. traverse stroke, 21". Max. grinding length, 16".



"Alignment for Better Internal Grinding", a new, sound color moving picture is available for free showing to engineering groups. Write for descriptive booking form.



USERS of internal grinders generally believe that once the grinding wheel passes the diamond, the form of the wheel will be a perfect cylinder. If the wheelhead is tipped so that its center line is not parallel with the motion of the longitudinal ways, the wheel cannot be trued to a perfect cylinder. In our illustration each wheel is tipped as it passes the diamond. Even though the diamond describes a straight line across the surface of the tipped wheel, the wheel will not be trued to a perfect cylinder. This is because the wheel is not being moved on a path along its own center line. When the wheel is tipped so that its center line "a" does not coincide with its direction of travel "b" as the wheel passes the diamond, an apparent taper "1" or "3", or an hour-glass "2" will be generated on the wheel. The vertical position of the diamond determines which one of these three forms will be produced on a tipped wheel. In this case we have two variables; that is, the wheel axis "a" may not coincide with its direction of travel "b", and the diamond may be above or below center.

Taper due to tipping of the wheel can be identified by raising or lowering the diamond. If the wheel is tapered as in "1" and after raising the diamond the form changes to "2" and again, after raising the diamond, the taper changes to "3", the front of the wheel (left end in illustration) is low and the wheel is tipped down. On the other hand, if the small diameter of the taper moves from right to left on the wheel as the diamond is progressively raised, the front of the wheel is tipped up.

An error in wheel form similar to those illustrated cannot produce a good hole either for size or shape, since there can be no straight line of contact for the full length of the wheel and the full length of the work as the wheel traverses. Furthermore, this distortion in the form of the wheel cannot be eliminated by simply turning the workhead. The remedy is to correct the alignment by bringing the wheel center line parallel with the wheel path (direction of wheel travel) and to the same height as the workhead center line, and setting the diamond in the plane established by the wheelhead and workhead center lines.

Bryant Chucking Grinder Company
Springfield, Vermont, U. S. A.

Internal grinders • Internal & External thread gages

SWANSON V-LINER (PATENTED) INSPECTION UNIT

A new, universal inspection device which integrates all of the normal requirements of the Inspection Department



Saves
space, man-hours,
tool investment.

BASIC UNIT INCLUDES: (1) a 60" surface plate; (2) an exclusive, concentricity checking attachment; (3) adjustable bench centers; (4) V-blocks; (5) sine plate; (6) indicator attachment. All are self-aligning and quickly adjustable or removable. Specifications and tolerances meet finest precision standards. Savings in space, man-hours and tool investment are substantial.

Write for Bulletin V-4

The V-Liner Inspection Unit incorporates, all of the skill, precision and experience gained by Swanson in more than a third of a century of designing and building special automatic machines. Swanson machines have reduced costs, increased output and improved precision in hundreds of manufacturing operations.

... other
PRECISION PRODUCTS
by **SWANSON**

V-Liner Concentricity
Checking Fixtures
V-Liner Holding Fixtures
Turret Index Units
Memory Devices for
Automatic Machines
Feeding Hoppers and
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Engineers and builders of
special, precision machinery



Quality since 1919

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CHANGE DRILLS IN A JIFFY

**NOW! ELIMINATE
SPECIAL LENGTH
DRILLS**

Widely used in the aircraft industry, this handy 9/32" diameter LITTLE BEAVER DRILL EXTENSION and 8-1/2" x 1/4" extension rod makes small diameter, recessed drilling easy in hard-to-get-at-areas. Used on metal and wood with regular drills.

The LITTLE BEAVER DRILL EXTENSION is used in power and hand drills, lathes, drill presses, turret lathes for home workshop, production, cabinet making and boatbuilding.

All for the
one low price of

5.95
PER SET
POSTPAID

SET CONSISTS OF
5 EXTENSION CHUCKS
8-1/2" x 1/4" EXTENSION ROD
5 HIGH SPEED DRILLS,
Sizes 1/16"-3/32"-1/8"-
5/32"-3/16"

FITS ALL 1/4" CHUCKS

No C. O. D.'s
Send check
or M. O. to

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183T New York Ave., Box 298, Huntington, N.Y.

Please send me ___ sets of the Beaver Extension Chuck and Rod at \$5.95 per set.

Name

Address

Write for
FREE Folder

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Punches and Dies

... for foot and power presses

Standard Punches and Dies of all sizes and shapes in stock—or made promptly to order. Also Adaptors and Die Shoes to convert your press. For power, foot or hand operation.

Round, square, rectangular, slotting, notching, louvre, angle, multiple, knock-out and other shapes. Precision made from high grade tool steel. **LET WARD PUNCH AND DIE FOR YOU!**

• Send for free illustrated catalog No. 152 AB—NET PRICE SHOWN! What are your punch and die needs?

WARD Machinery Co. 564 West Washington Chicago 6

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THE FELLOWS GEAR SHAPER COMPANY, SPRINGFIELD, VERMONT

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The Tool Engineer

**Faster production
at lower cost**

**MODERN
COLLAPSIBLE
TAPS**



**FOR EITHER
STATIONARY OR
ROTARY USE**

Modern Precision Tools
Include

STATIONARY SELF-OPENING
DIE HEADS
ROTARY SELF-OPENING
DIE HEADS
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COLLAPSIBLE TAPS
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- Easy and quick adjustment. No special tools required.
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- Thread length setting undisturbed by diametrical adjustment.
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- Simple in design. No complicated mechanisms.
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Send for full information on this new improved Modern Collapsible Tap and its cost reducing possibilities applicable to your tapping

MODERN TOOL WORKS

DIVISION

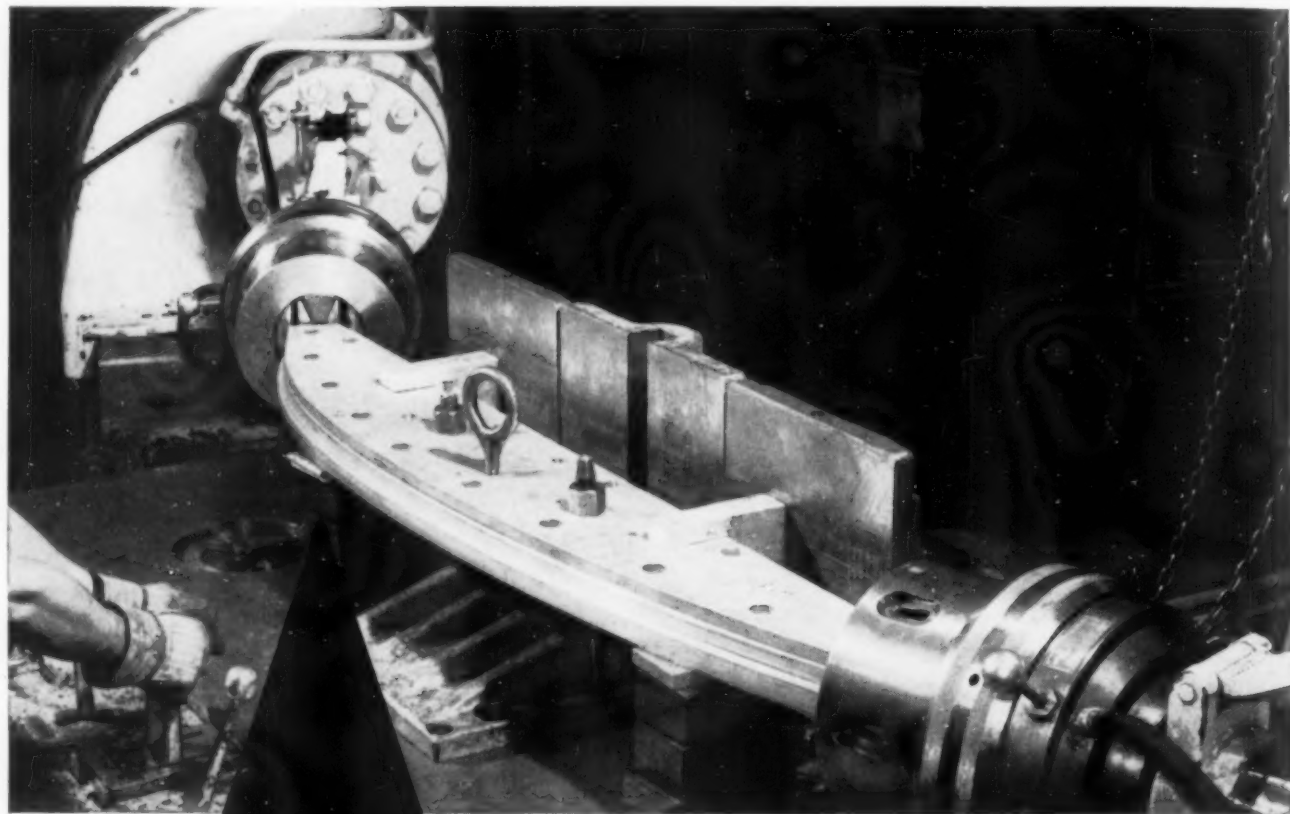
CONSOLIDATED MACHINE TOOL CORPORATION

SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED

ROCHESTER, NEW YORK

This stretch forming die is aluminum (Alcoa Aluminum Tool & Jig Plate) because aluminum dies are lighter, easier to handle, faster to machine and cost less to make than those of steel. Many manufacturers are using Alcoa Tool & Jig Plate for assembly and machining fixtures, dies for low-pressure molding of rubber and plastic, and dies like this one which form aluminum sheet.

Alcoa Tool & Jig Plate is a cast product, fully normalized and strain relieved. It is available from stock in thicknesses of $\frac{3}{8}$ " to 4" and in dimensions up to 48" x 96". For full information on Alcoa Tool & Jig Plate, contact your local Alcoa sales office . . . or write Aluminum Company of America, 1952-E Alcoa Building, Pittsburgh 19, Pa.



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Forming
Die is
Aluminum**

Alcoa 
Aluminum

ALUMINUM COMPANY OF AMERICA

It doesn't take a heavyweight to do a man-sized job



Before these shears were shifted to air operation the entire weight of a man was required on the foot treadle to cut the sheet metal.

All this is changed now. A light touch of the girl's foot on the pedal puts all the power of the Schrader Air Cylinder to work, sending the knife-edge through the metal.

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To find out how Schrader air control products can be put to work . . . to boost production . . . lessen operator fatigue . . . increase safety . . . send us a letter outlining your particular requirements, your idea or fill out the coupon below.

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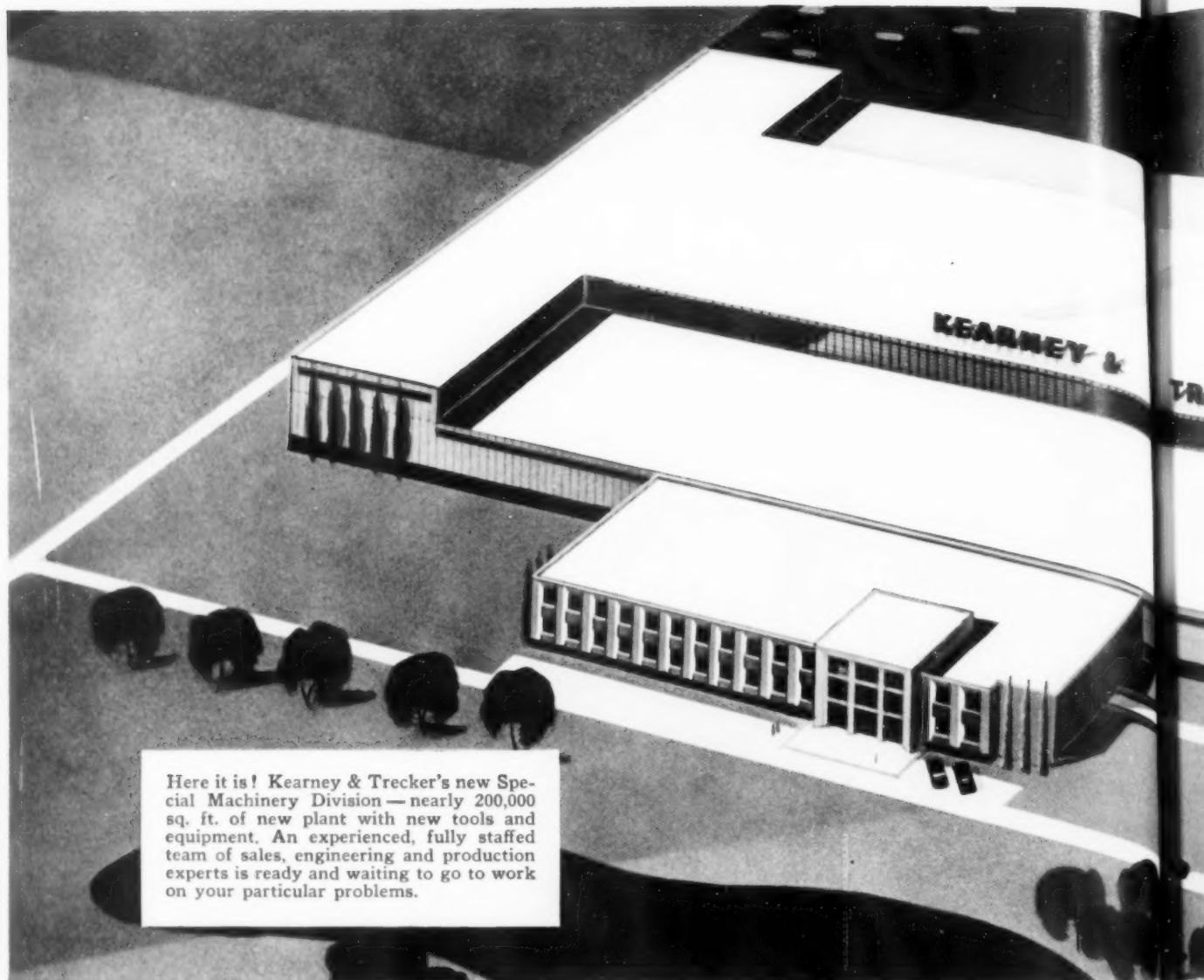
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Name.....Title.....

Company.....

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Here it is! Kearney & Trecker's new Special Machinery Division — nearly 200,000 sq. ft. of new plant with new tools and equipment. An experienced, fully staffed team of sales, engineering and production experts is ready and waiting to go to work on your particular problems.

INCUBATOR...for Production

**This plant is being built for you . . .
to engineer *new* production methods
— to build the large or small special
machines, tools and fixtures you need
to improve production and cut costs.**



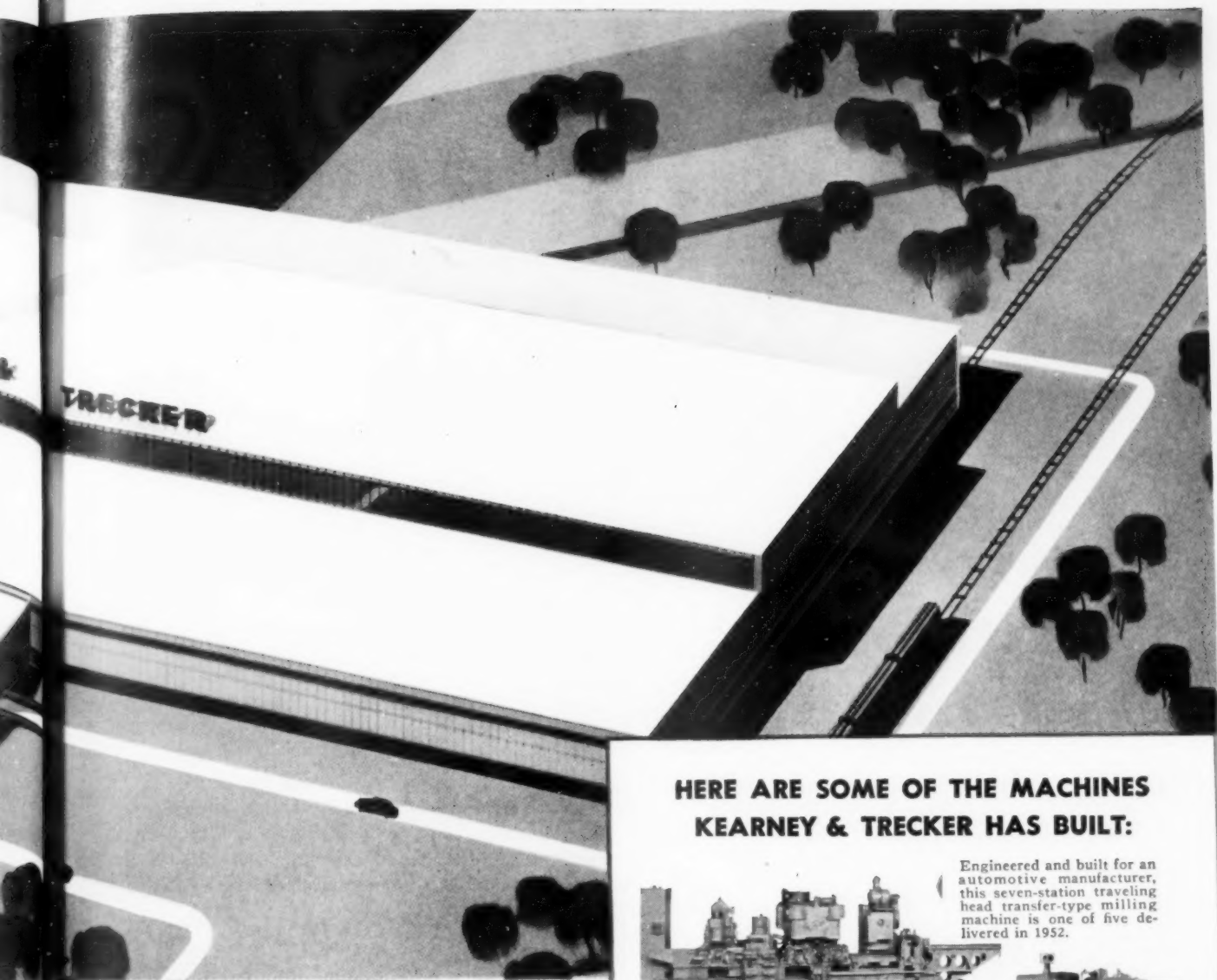
Production behind schedule?

Costs going up, up and up?

Will special machines, special tools and fixtures or special arrangements of standard machines help you solve these problems?

Then why not be among the first to take advantage of the 5-million-dollar-plus investment that Kearney & Trecker is making in new plant, new tools and new engineering to help you solve them.

Kearney & Trecker is *no* newcomer to the field of special machine tools and allied special equipment. There are literally millions of dollars worth of Kearney & Trecker special machinery in plants all over the world. Equipment built over the period of more than 50 years of Kearney & Trecker's existence. And that doesn't include the 60,000



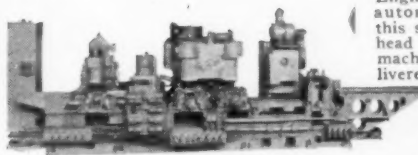
Ideas

Kearney & Trecker standard milling machines and other machine tools so well known and so widely accepted everywhere.

Kearney & Trecker is already working on new production ideas, new equipment and tool designs to be produced in this plant. Kearney & Trecker Special Engineering and Methods Analysts are ready right now to serve you with (1) Prompt response to your inquiry, (2) Immediate engineering help on your problem, plus, (3) The newest, finest and most complete facilities to build the special equipment you need — big or small.

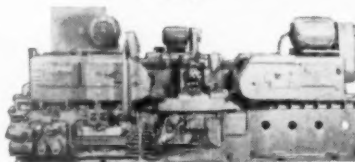
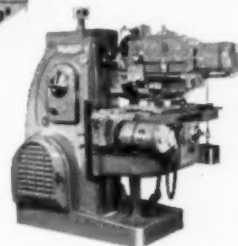
Phone, write or wire The Special Machinery Division, Kearney & Trecker Corporation, Milwaukee 14, Wis., today. Get the facts about Kearney & Trecker's Special Machinery Division and how it can serve you.

HERE ARE SOME OF THE MACHINES KEARNEY & TRECKER HAS BUILT:



Engineered and built for an automotive manufacturer, this seven-station traveling head transfer-type milling machine is one of five delivered in 1952.

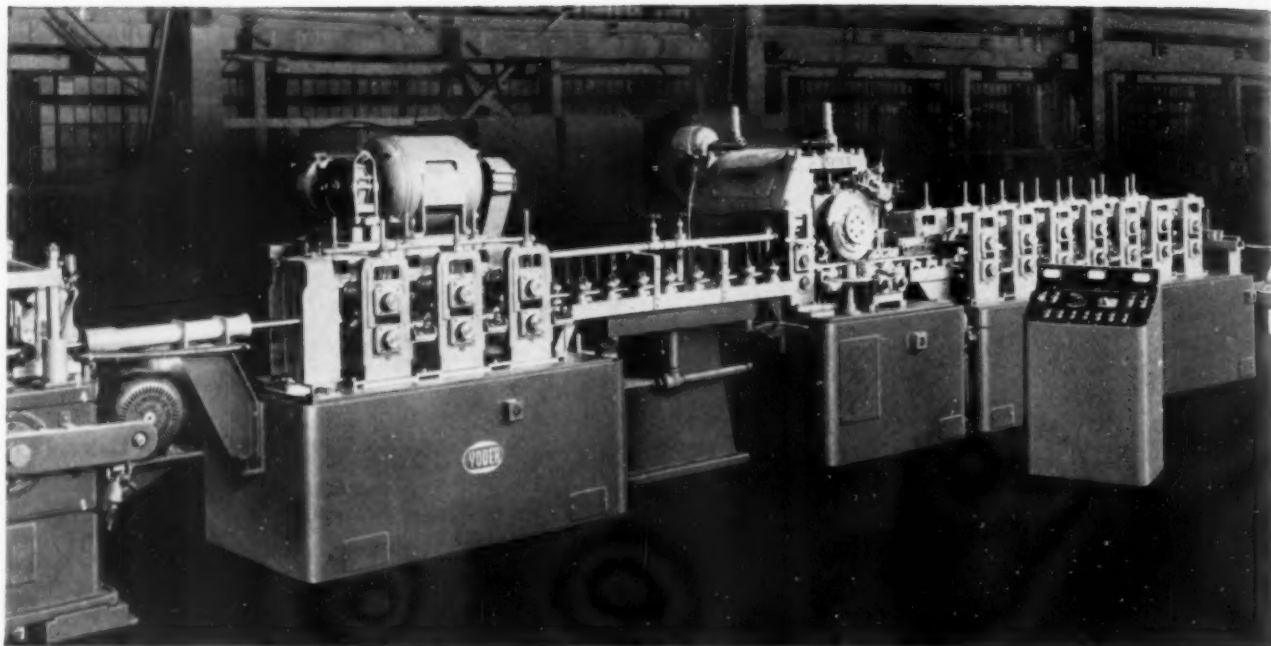
Special knee-type cam milling machine — the first of twelve such machines to be built for the nation's largest manufacturer of shoe-making machinery.



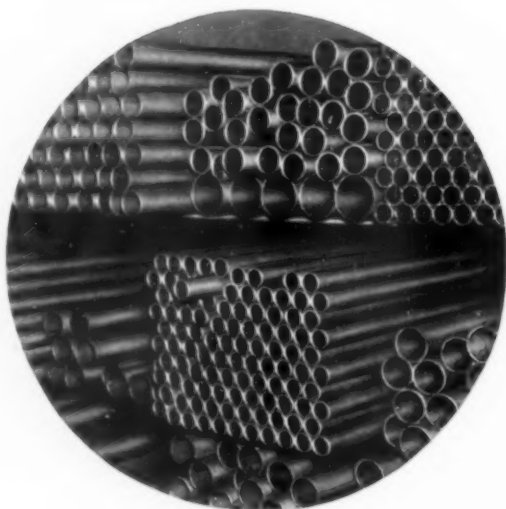
This huge four-station rotary indexing machine, built for major automotive manufacturer, is equipped with three horizontal milling heads.

Here is a partial list of the machines that will be built:

- | | |
|--|--|
| Standard and special bed type milling machines. | Special machines for the automotive, aircraft and farm implement industries. |
| Special index milling machines. | Special boring machines. |
| Special transfer milling machines. | Rise and fall milling applications. |
| Special index or transfer machines involving a combination of milling, boring, drilling or tapping to perform all operations on a workpiece. | Modified standard and special knee-type milling machines. |
| | Special tooling for standard milling machines. |



Highest Output of



Quality Tubes

• Most manufacturers, when investing in an electric-weld tube mill, do so only after careful investigation, especially of performance records. Where, as often happens, records are available of the output and scrap losses of different mills, making comparisons possible, the choice of a Yoder is never in doubt. As a result, since their introduction in 1938, more Yoder mills have been installed in the U.S.A. and many foreign countries than electric-weld mills of all other makes combined.

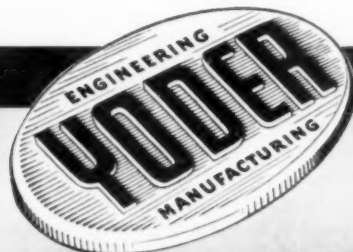
In fact, the high quality and economy of tubing made in Yoder mills, have powerfully stimulated consumption and multiplied the uses for electric-weld tubing in the automotive, electric appliance, metal furniture and other mass production industries. The supply of such tubing, therefore, has never caught up with the demand.

Get the facts about Yoder mills, incorporating the latest developments in tube making, including the revolutionary new Yoder high speed induction welders for *non-ferrous as well as ferrous metals* and alloys.

THE YODER COMPANY
5525 Walworth Ave. • Cleveland 2, Ohio

Complete Production Lines

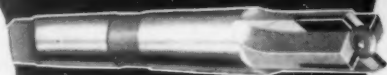
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- ★ GANG SLITTING LINES for Coils and Sheets
- ★ PIPE and TUBE MILLS—cold forming and welding



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by SUPER

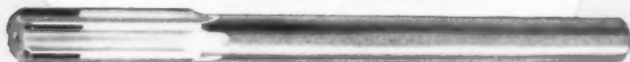
CARBIDE END MILLS



CARBIDE TWIST DRILLS



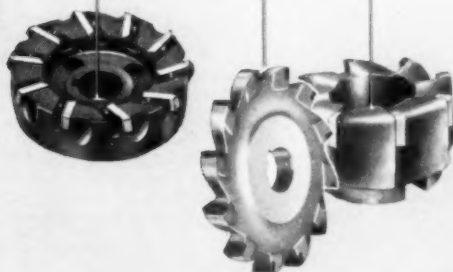
CARBIDE REAMERS



CARBIDE SPECIAL TOOLS



CARBIDE MILLING CUTTERS



CARBIDE TOOL BITS



The Super line of carbide tools features aggressive and up-to-the-minute thinking in cutting tool design. More than 50 items in a complete range of sizes are carried in stock in warehouses conveniently located in New York, Detroit, Chicago and Los Angeles.

Super
TOOL COMPANY

21650 Hoover Road, Detroit 13, Michigan
also 5210 San Fernando Rd., Glendale 3, California

FOR PRECISION

PLUS PRODUCTION...

PRECIS-O-NIZING



OLD mass production methods are not enough to satisfy a market that is demanding both quality and lower prices.

Only through modern precision-production techniques can a manufacturer hope to use this two-edged sword to his own advantage!

Because of this need for a productive method of generating precision... the Microhoning process was evolved. For a quarter of a century the Micromatic Hone Corporation, working with industry, has led the honing field in the development of equipment that would productively finish parts within the ever-shrinking tolerances of new designs and standards.

This applied precision-adeptness of the Microhoning process is "PRECIS-O-NIZING".

In one economical operation Microhoning abrades stock rapidly and efficiently with a minimum of heat to generate—

- bores that are round and straight
- accurate diametric size
- a functional characterized (cross-hatch pattern) surface finish that is free of smeared or distorted material.

The processing of sewing machine parts is an example of PRECIS-O-NIZING.

Shown are typical industrial sewing machine parts that are Microhoned. Total tolerance for size, roundness and straightness is held to .0003 inches, or less.

The shaft bushings (needle, presser, eccentric, hook...) are specific applications of functional Microhoning.

The characterized cross-hatch pattern and the precision of Microhoning enable these rotating and reciprocating bushings to retain minute reservoirs of lubricating oil. At the same time, they maintain such precise fit with their shafts that a working seal is formed and there is no leakage of oil. Similar parts are interchangeable; selective fitting of components is no longer necessary.

Microhoning equipment is available to handle all kinds and sizes of parts... from soft non-ferrous metals to hardened steel and special alloys... from .078 to 60 inches in diameter and from 1/4 inches to 75 feet in length.

MICROHONING = STOCK REMOVAL + GEOMETRY + SIZE CONTROL + SURFACE FINISH



MICROMATIC HONE CORPORATION •

8100 Schoolcraft, Detroit 4, Michigan

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
Boston Post Road
Guilford, Connecticut

MICROMATIC HONE CORP.
614 Empire Building
206 So. Main Street
Rockford, Illinois

MICROMATIC HONE LTD.
330 Grand River Avenue
Brentford, Ontario, Canada

MICROMATIC HONE CORP.
1535 Grande Vista
Los Angeles 23, California

MICROMATIC HONE CORP.
MICRO-MOLD MFG. DIV.
231 So. Pendleton Avenue
Pendleton, Indiana

REPRESENTATIVES: Overgard Machine Tool Company, 234 Commonwealth Bldg., Denver 2, Colorado
Halliday Machinery Co., 2726 First Ave., South Seattle, Wash. • REPRESENTATIVES IN ALL PRINCIPAL COUNTRIES

For
quality control
you can be
proud of



When you have inspection and quality control procedures you're proud enough of to talk about, they must be good.

These three advertisements were published by firms justly proud of their methods. All three use Kodak Contour Projectors as an example of the type of care they exercise in producing products of uniformly high precision.

Optical gaging with a Kodak Contour Projector provides a fast, accurate method of production measurement and inspection. Operators can get the work out in a hurry—little training is required. Accessories are available to make possible measurement of the most complex shapes.



To see how a Kodak Contour Projector can help you reduce inspection costs, improve quality, send for our new 12-page booklet. It gives you details of both the Model 2A, for precision micrometry, and the Model 3, for fast, routine gaging. For your copy, write to:

Industrial Optical Division
EASTMAN KODAK COMPANY
Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR



A new sound movie, Optical Gaging, shows how to simplify complex inspection problems. We'll tell you how to get it for a showing.

Kodak

*Put your tooling and
production problems
into the capable hands of*
**"DOUGLAS
PRODUCTIONEERS"**



"Douglas Productioneers" are skilled craftsmen—available at all times to go anywhere in the world and set up an efficient tooling and production program. They are capable of building or re-working all types of jigs, dies, fixtures, special gages and tools from your tool drawings or prints and are experts on optical tooling. "Douglas Productioneers" will, if necessary, train your men to build or operate both special and standard equipment.

Manufacturers of aircraft frames and machined products have used and are using "Douglas Productioneers." The amount of time and money saved has been very substantial. These men can do the same for you on your next tooling and production program.

Other Specialized Engineering Services

Engineering research and development	Time study
Engineering research and analysis	Production control
Product design and development	Job evaluation
Industrial processing	Quality control
Tool design	Material handling
Plant layout	Material control
Electronics	Experimental development and building
	Designing and building special machinery



**PRODUCTIONEERS FOR INDUSTRY
DOUGLAS
ENGINEERING CO.**

3437 Goldner
Detroit 10, Michigan

USE READER SERVICE CARD; INDICATE A-5-194-1

A FEW "POINTS" TO REMEMBER



When in need of the best in Carbide tools remember to specify "NORTH-WEST"!



▲
Consistent performance
regrind after regrind!

▲
LOOK for this
mark of quality

Full-size tips, uniformly brazed, have diamond ground cutting edges. "North-West" tools are tipped with Carboloy cemented Carbide.

Many of your requirements can be met by altering standard tools from stock!

Precision built, flat, single point, carbide cutting tools.

Carbide cutting tools made to your own specifications.

A complete line of Standard Carbide cutting, turning and boring tools. Available immediately from stock.

Distributors in all leading cities.

Write for catalog.

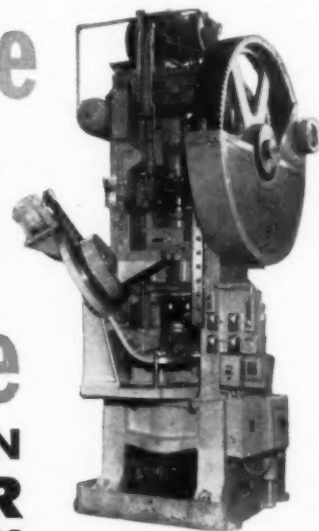
THE NORTH-WEST TOOL COMPANY
10 North Kilmer St., Dayton 7, Ohio

USE READER SERVICE CARD; INDICATE A-5-194-2

choose

Your coolant pump
with the same care
that you choose
your metal cutting
machine...

**choose
RUTHMAN
GUSHER
COOLANT PUMPS**



This #85 Bliss Reducing Press is equipped with a Ruthman Gusher Coolant Pump.

Photo Courtesy E. W. Bliss Co.



For speedy and efficient production on your machines choose Gusher Coolant Pumps. Gusher Pumps give you split second coolant control. There is no priming or packing necessary. They are pre-lubricated and electronically balanced to assure you long trouble-free life.

So choose wisely, choose Gusher Coolant Pumps for your machines.

THE RUTHMAN MACHINERY CO.
1810 Reading Road Cincinnati, Ohio

USE READER SERVICE CARD; INDICATE A-5-194-3

The Tool Engineer

PARKER • MAJESTIC



PRECISION MACHINES



Pictured here is the home and products of
PARKER-MAJESTIC, INC.

For almost a quarter of a century this company has manufactured the Parker Spindles used in Precision Grinding, Boring and Milling applications. Additional products include the well known line of Parker-Majestic Internal, External, No. 2 Surface and Rotary Surface Grinders.

Descriptive literature upon request.



PARKER-MAJESTIC, INC.

formerly MAJESTIC TOOL & MFG. CO.

147 JOS. CAMPAU

DETROIT 7, MICHIGAN



Bay State Taps

...for precision **plus** performance.
On nearby shelves of
Industrial Supply Distributors.

BAY STATE TAP & DIE COMPANY • MANSFIELD • MASS.

USE READER SERVICE CARD; INDICATE A-5-196-1

QUALITY Depends on ACCURATE INSPECTION

Accuracy of measurement depends on the precision of the measuring tools. Provide your shop and inspection department with dependable and proper inspection tools.

MEEHANITE METAL TOOLS, made to close tolerances, are furnished in many types.



Surface Plates
Box Parallels
Slotted Angle Plates
Universal Right Angles
Parallels
Lapping Plates
Toolmakers' Knees
Straight Edges
Masterangle Plates
Angle Attachments

Surfacer Plates Rescaped

ACME TOOL COMPANY
75 W. BROADWAY NEW YORK 7, N.Y.

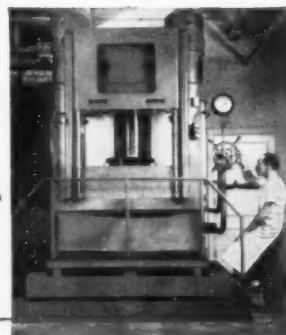
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Important addition

TO SUMMIT-ROBERTS TOOL CO.

... a 2500 ton hobbing press

For over 20 years we have hobbled cavities in only the highest quality hobbing steel. Now, by industry demand we offer our services to cold hobb your cavities for



MOLDS for Plastics

Die casting Dies

We can make the hobs or use yours.

Visit our plant personally and inspect our modern facilities, where you will see one of the most unusual, outstanding and fully equipped shops in the country.



Summit-Roberts Tool Co.
830 NEW YORK AVE. • TOLEDO, OHIO

USE READER SERVICE CARD; INDICATE A-5-196-3

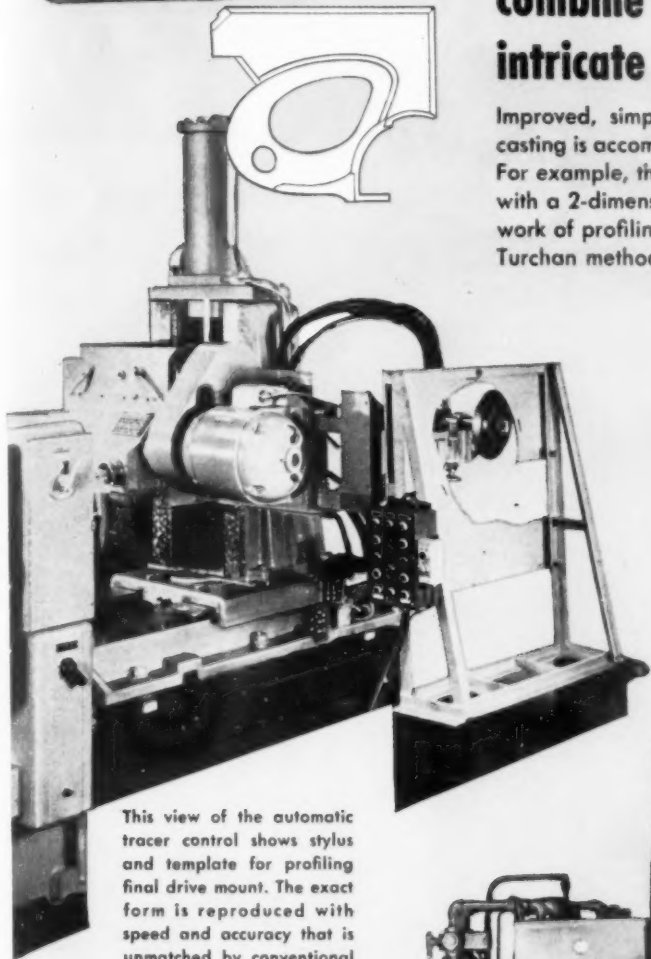
The Tool Engineer



Turchan and **FORNEY**

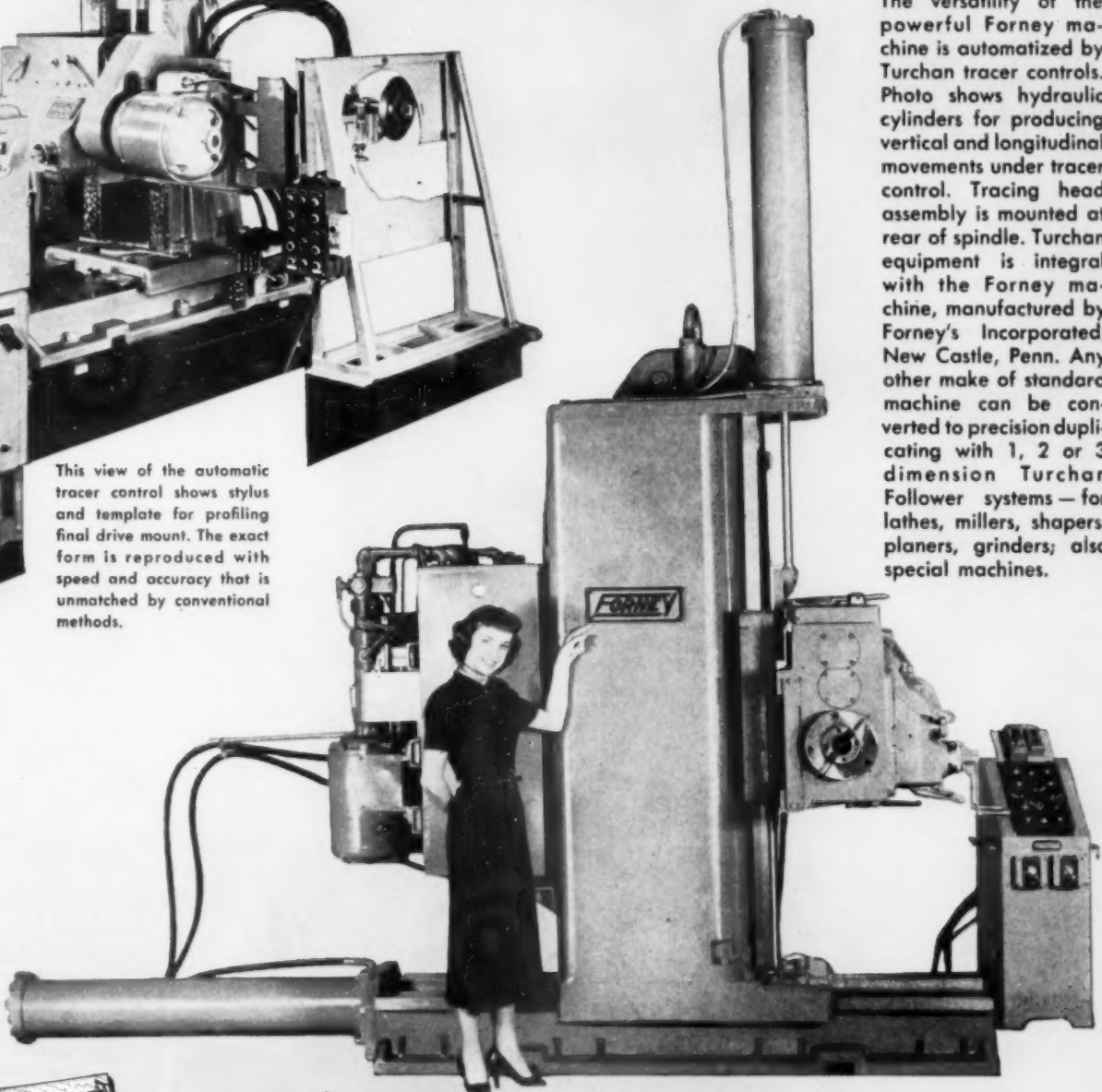
combine skills to simplify machining of intricate final drive mount for the M-48

Improved, simplified machining of this irregular part from armor plate casting is accomplished, in several plants, with the aid of Turchan Followers. For example, the Forney Horizontal Boring and Facing Machine, equipped with a 2-dimension Turchan Hydraulic duplicating attachment, makes easy work of profiling and boring the various openings in this final drive mount. Turchan method of tracer-controlled duplicating saves up to 60% in time.



This view of the automatic tracer control shows stylus and template for profiling final drive mount. The exact form is reproduced with speed and accuracy that is unmatched by conventional methods.

The versatility of the powerful Forney machine is automatized by Turchan tracer controls. Photo shows hydraulic cylinders for producing vertical and longitudinal movements under tracer control. Tracing head assembly is mounted at rear of spindle. Turchan equipment is integral with the Forney machine, manufactured by Forney's Incorporated, New Castle, Penn. Any other make of standard machine can be converted to precision duplicating with 1, 2 or 3 dimension Turchan Follower systems — for lathes, millers, shapers, planers, grinders; also special machines.



Write for Bulletin
Gives full information on the many advantages of Turchan automatic tracer-controlled duplicating.

Do you have a machining problem? Send specifications of job. Give make and model of machine. We'll show you how to produce it better, faster, at lower cost.

Turchan FOLLOWER MACHINE COMPANY
8339 LIVERNOIS AVENUE • • • DETROIT 4, MICHIGAN

**FOR BETTER SURFACE
USE STERLING'S No. 2**



Plus VALUE
ABRASIVE PRODUCTS
FOR
• BETTER GRINDING
• FASTER GRINDING
• LOW COST GRINDING

THE STERLING ABRASIVES

OF THE CLEVELAND

BRANCHES... BOSTON — CHICAGO — CLEVELAND — DETROIT

GRINDING EVERYTIME CHUCK AND SEGMENTS

For cooler, more accurate, longer-lasting grinding, these patented abrasive units provide better job control with superior, low cost results.

Sterling Segments are available in job-tested combinations of abrasive grain bond and structure to do a better, faster, more economical surfacing job. Their interlocking design results in cooler operation and makes for greater strength, under grinding stress, throughout the entire abrasive assembly. Being identical in design, they are easily retained by the unique chuck holding device and quickly removed for replacement of new units. The slightly curved segment profile creates a shearing action that speeds completion of your job.

- Sterling No. 2 Chucks are easily installed, even by inexperienced workers. Their unusual light weight makes them easy to handle and imposes no unusual demands on the machine—more power is used for grinding! This modern chuck has features found in no other unit; it is made in sizes to fit practically any surface grinder in your plant.

- May we show you how Sterling Segments, tailor-made to the demands of your special surfacing problems, can eliminate all your production worries? Write for the free services of a Sterling engineer *today!*

BEST IN THE TEST --- THAT'S STERLING

- In competition with another brand, Sterling's Segments cut faster, with correspondingly greater stock removal. With the competitive units, it was necessary to use a second fine-grained assembly to obtain the desired finish. With the Sterling segment assembly, both roughing and finishing operations were accomplished with the same specification! Result—a distinct saving in down-time, with more and a wider range of grinding.

**Ask for the STERLING
Research and Development Folder
on Better Surface Grinding!**

- At no obligation, write today for your copy of the attractive, informative folder on Sterling's No. 2 Chuck and Segments. It gives data and prices on all sizes and indicates the machines on which they are to be used. Here is proof of economy and efficiency in which you will be interested! Send now for this important information that guarantees better results from your surface grinding assignments.



DIVISION



QUARRIES COMPANY

TIFFIN OHIO

LOS ANGELES—NEW YORK—DISTRIBUTORS IN ALL PRINCIPAL CITIES

CAN YOU COMPETE SUCCESSFULLY?

or . . . is out-of-date equipment
putting you out of the running?



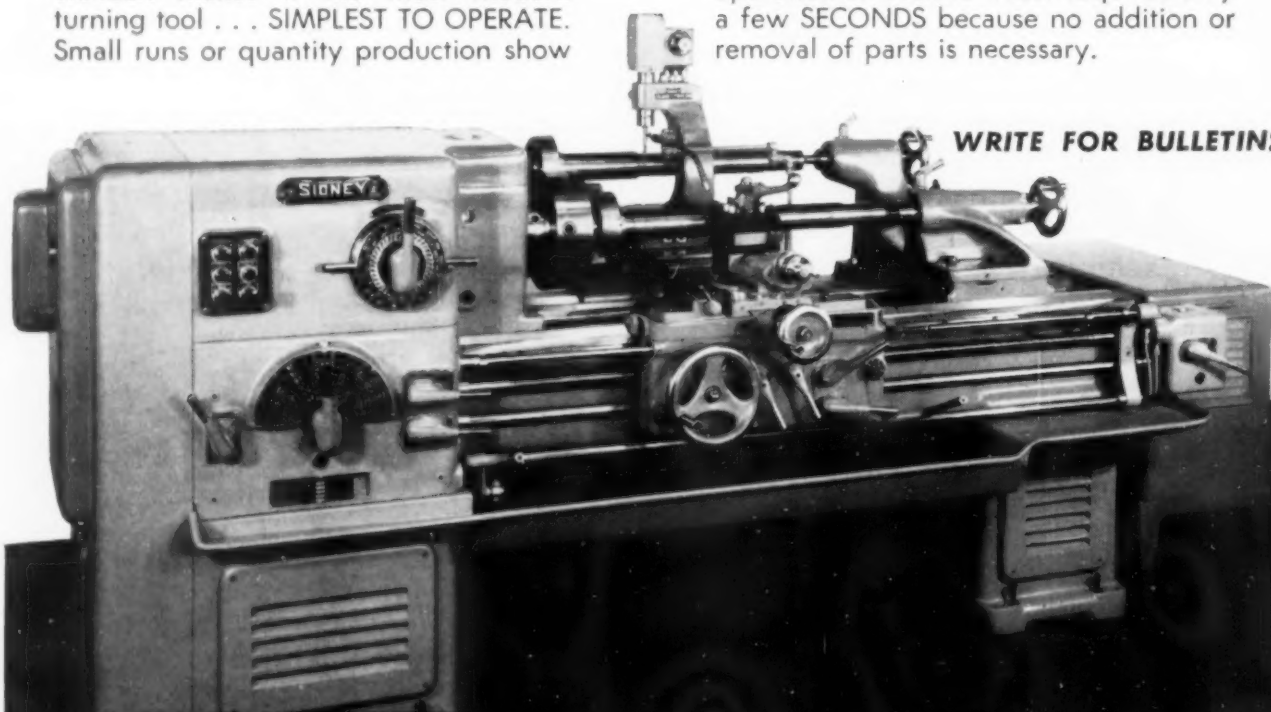
Obsolete equipment is a vicious
tax on your costs and produc-
tion. it ruins efficiency . . .
make costs spiral sky-high
... puts the KO on your
estimates instead of the
OK you are bidding for.

SIDNEY FLUID TRACER LATHES

HELP YOU OVERCOME
COMPETITION

Furnished in connection with any size
or model of Sidney Lathe, the FLUID
TRACER makes it the most modern
turning tool . . . SIMPLEST TO OPERATE.
Small runs or quantity production show

TREMENDOUS SAVINGS PER FINISHED
PIECE. Change-over to standard lathe
operation or back to tracer requires only
a few SECONDS because no addition or
removal of parts is necessary.

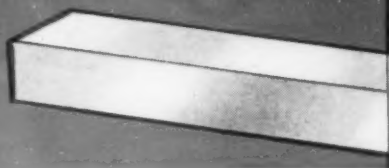


WRITE FOR BULLETINS

THE SIDNEY MACHINE TOOL CO. • SIDNEY, OHIO

Builders of Precision Machinery since 1904

REYNOLDS ALUMINUM CAST PLATE AND BAR



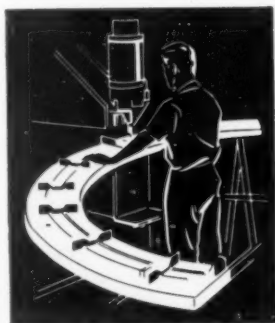
A Revolutionary Material for Low Cost Tools, Dies and Fixtures

Reynolds cast aluminum plate and bar of high dimensional stability offers better performance, and longer production life than other low cost tool and die materials. First proved superior in the aircraft industry, cast aluminum plate and bar is now used in many other industries when short to medium production runs and experimental tools and dies are a problem.

Included among the outstanding features of Reynolds cast aluminum plate and bar are fine grain structure; precision surfaces; high strength; light weight; low cost; fast, free-machining; excellent thermal characteristics and a wide range of standard sizes.

For full details on Reynolds Aluminum Cast Plate and Bar, call your nearby Reynolds office listed under "Aluminum" in the classified telephone directory, or write Reynolds Metals Company, 2525 South Third Street, Louisville 1, Kentucky.

Write for free catalog, "Reynolds Aluminum Cast Plate and Bar for Machine Shops, Foundries and Pattern Shops."



Be sure to see "Mister Peepers" every Sunday night, 7:30 EST, NBC-TV; hear "Fibber McGee and Molly" every Tuesday night, 9:30 EST & PST, NBC.

REYNOLDS



ALUMINUM

M O D E R N D E S I G N H A S A L U M I N U M I N M I N D

It's All in a
Day's Work
When

ONE MAN
SNAGS
1600 CYLINDER
HEADS—
with a



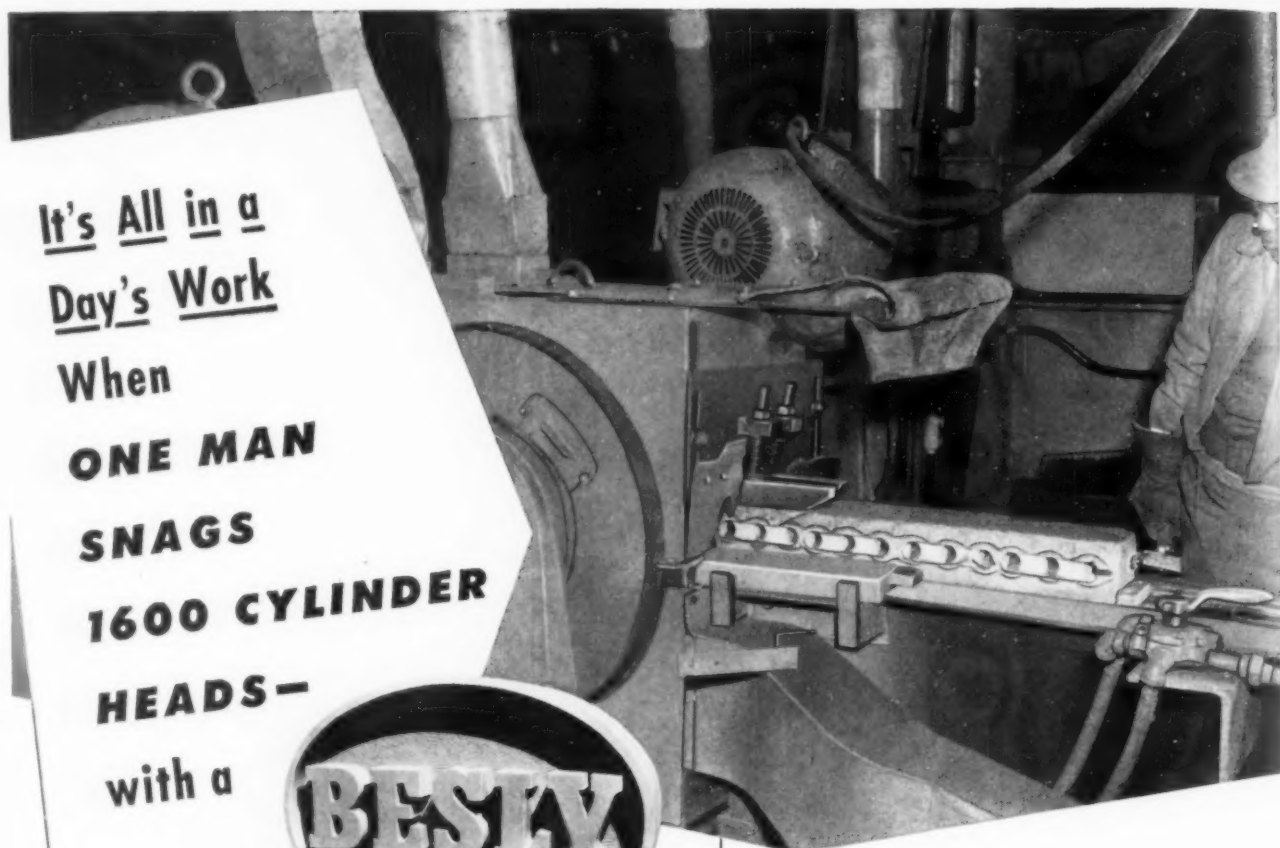
GRINDER

***A Man and a Grinder Replace a
Crew of Hand Chippers to Avoid Holdups
in Feeding Automobile Engine
Production Line!***

A Besly No. 630-30" Double Spindle Dry Grinder, attended by one man, now snags the fins from 1600 automotive cylinder head castings a day. Cast iron heads five to six inches thick, are conveyed hot from the foundry to the grinder operator who breaks off larger pieces of excess metal with a few hammer blows. The castings are then moved to a power-driven feeding fixture on the Besly Grinder, and fins 3/16 to 5/16-inch thick are ground off automatically *with a single pass*, producing clean, smooth, ready-to-machine castings.

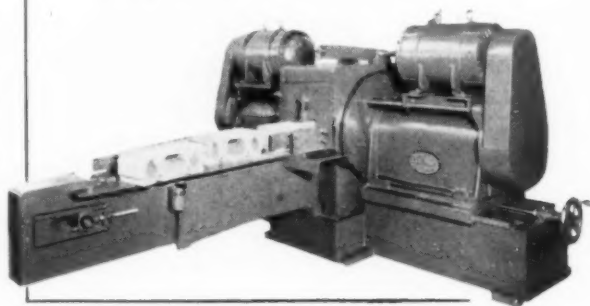
It is production policy to meet the required cylinder head quota daily. With the Besly Grinder set-up, this manufacturer makes considerable savings in labor since a hand chipper crew is no longer required . . . and gets a better, more satisfactory job as well.

With changes in fixturing, the Besly No. 630 Grinder can be adapted to a wide variety of grinding operations, one of which may well speed and simplify your manufacturing process. Ask your Besly representative about this and other cost-cutting Besly Grinders for all needs!



ABOVE: No. 630-30" Besly Double Spindle Dry Grinder set up to grind cylinder head castings. Two 30" x 2" x 6" Besly-Titan Steelbac Abrasive Discs are driven through multiple vee-belt transmissions by two 25 HP, totally enclosed, fan-cooled, ball-bearing motors. Equipped with special exhaust hood and swinging arm wheel truing device. The continuous chain feeding fixture is motor driven through a worm and worm gear reducer. Special guide plates and spring-loaded hold down shoes accommodate the various castings.

BELOW: Besly No. 630 Grinder fixtured for smooth-surfacing tops and bottoms of concrete blocks.



BESLY-WELLES CORPORATION

Established in 1875 as
CHARLES H. BESLY & CO.
118 Dearborn Ave., Beloit, Wis.

BESLY GRINDERS and ACCESSORIES • BESLY TAPS, DRILLS,
REAMERS, END MILLS • BESLY-TITAN ABRASIVE WHEELS

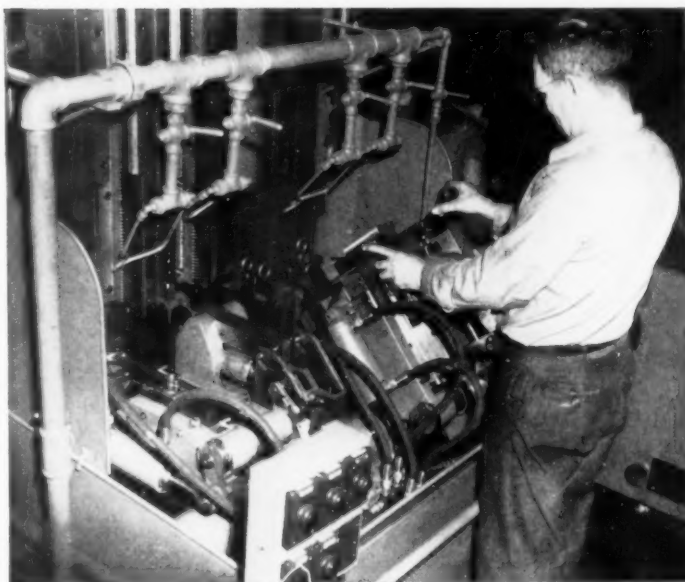
Here's

- ▶ **BALANCED PRODUCTION**
- ▶ **SIMPLE LOADING**
- ▶ **AUTOMATIC CLAMPING**

the *American* [★]WAY

SIMPLE LOADING plus AUTOMATIC CLAMPING gives the manufacturer of these connecting rods and caps BALANCED PRODUCTION at the rate of 300 complete assemblies per hour.

The installation, engineered the American-way, consists of a Standard American 10-ton, 42-inch stroke vertical duplex hydraulic broaching machine and two, two-station fixtures mounted on completely automatic tilting-type work tables. Fixtures are interchangeable. One station on each fixture holds a rod part, the other a cap. The operator simply PLACES a rod and a cap on the first fixture . . . then pushes the control buttons. The parts are CLAMPED AUTOMATICALLY while the table tilts down and then broached. While one assembly is broached the operator loads the other fixture.



AMERICAN CAN HELP YOU SOLVE YOUR PRODUCTION PROBLEMS

Just as American has helped thousands of other manufacturers during the past twenty-five years, they can help YOU solve your production problems. For the answer to your problems send a part-print or sample and hourly requirements Address Dept. T.



WRITE TODAY for your copy of American's Circular No. 300 on American Vertical Hydraulic Surface Broaching Machines.



American [★]BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN



See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

May, 1953

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-203

203

Why Fiddle Around with OLD-FASHIONED Depth Gages?

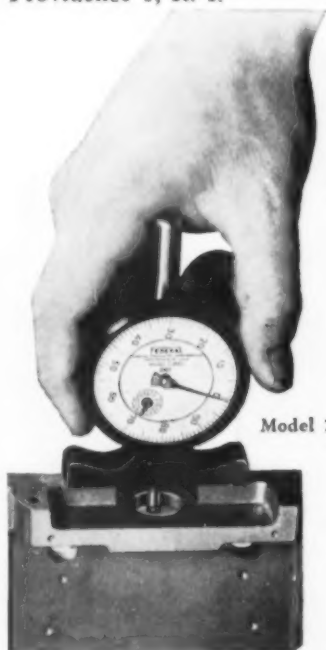
A MAN HAS TO DEVELOP A PRETTY KEEN SENSE OF TOUCH to use a flush pin gage with even reasonable accuracy. And such gages don't show any *trend* when the dimension is getting out-of-control until the operator is producing wrong depths. Micrometer depth gages are slow — they're not as fast, positive or accurate as Dial Indicator Depth Gages.

Federal offers several stock types of Depth Gages and will design and build other types to suit your particular requirements. Tell us what you need and we'll show you something to fit that need. Write, giving us the details. FEDERAL PRODUCTS CORPORATION, 1195 Eddy Street, Providence 1, R. I.



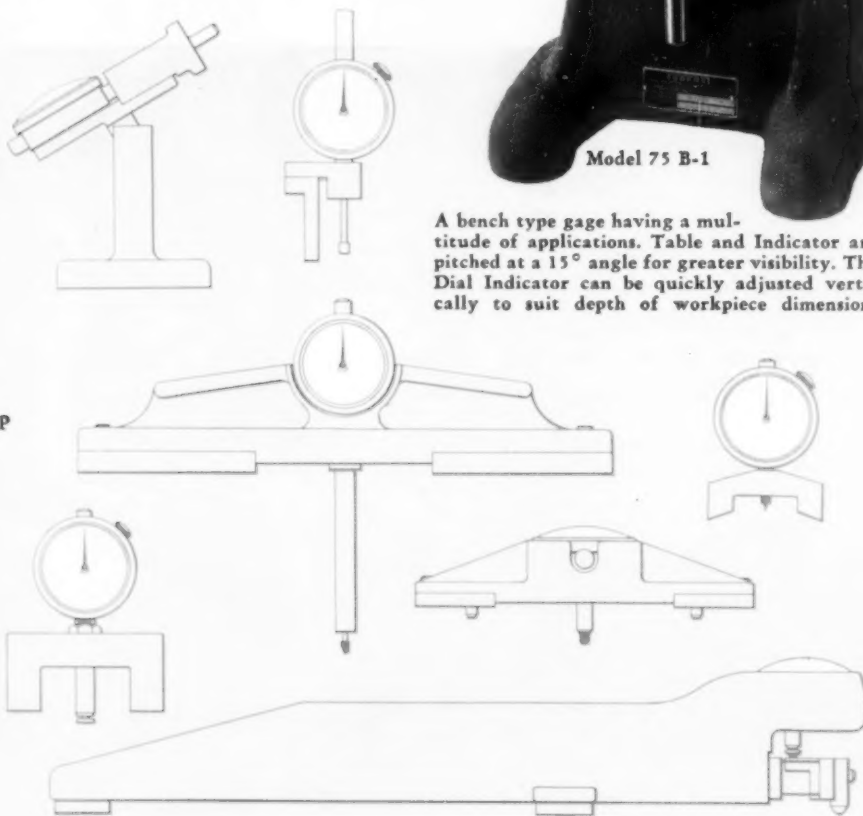
Model 75 B-1

A bench type gage having a multitude of applications. Table and Indicator are pitched at a 15° angle for greater visibility. The Dial Indicator can be quickly adjusted vertically to suit depth of workpiece dimension.



Model 75P

A regular catalog type of portable depth gage which can be had with various lengths of contact points, either radius or pin-pointed, and either self-locating or push-down spindle.



Have you seen or shown the Federal movie,

"Gaging for Profit"

It's in full-color with sound. Shows the latest developments in all kinds of gaging methods. Write for reservation.

FEDERAL

Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES



Photograph by Morton Berger

TAPS *by* CARD

Many years of designing and manufacturing one chief product make Card the foremost name in Taps.

Completely stocked offices at Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle.

See your local Card distributor for prompt deliveries and helpful service

W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO.



TAPS • DIES • SCREW PLATES

UNION



*Untouched Photograph
by Morton Berger*

Designed to take it

UNION TWIST DRILL COMPANY • ATHOL, MASSACHUSETTS
Milling Cutters Gear Cutters Twist Drills Hobs Reamers Carbide Tools

OWNERS AND OPERATORS OF: S. W. CARD MANUFACTURING CO. DIVISION, Mansfield, Mass.
BUTTERFIELD DIVISION, Derby Line, Vermont and Rock Island, Quebec

SAVE TIME—ORDER BY TELEPHONE FROM YOUR LOCAL UNION DISTRIBUTOR

Ask your Distributor



Photograph by Paul Davis

Under the test of performance there
can be no question—Butterfield drills
cost less in the long run.

B U T T E R F I E L D

Union Twist Drill Company Butterfield Division Derby Line, Vermont, U. S. A.

TAPS • DIES • REAMERS • DRILLS • COUNTERBORES • SCREW PLATES



*M/Sgt.
Harold E. Wilson, USMCR
Medal of Honor*

He Held On All Night

OUT OF THE SPRING NIGHT, the Red banzai attack hit like a thunderstorm. The darkness exploded into a nightmare of flaming confusion. But Sergeant Wilson went into action at once, rallying his hard-pressed men.

Bullets wounded his head and leg; disabled both arms. Refusing aid, he crawled, bleeding, from man to man, supplying ammunition, directing fire, helping the wounded.

As the attack grew fiercer, a mortar shell blew him off his feet. Still, dazed

and weakened, he held on, leading the fight all night till the last Red assault was beaten off. At dawn, by sheer courage, the Sergeant had saved not only his position, but the precious lives of his men.

"In Korea," says Sergeant Wilson, "I didn't think about where our weapons came from—I just thanked God they were there."

"Now, back home, I realize what's behind those arms. The united strength of millions of thrifty, hard-working

folks like you—who are making America safer by investing in U. S. Defense Bonds. Maybe you've thought you were just saving money. Believe me, you're saving men's lives, too!"

★ ★ ★

Now E Bonds pay 3%! Now, Series E Bonds start paying interest after 6 months. And average 3% interest, compounded semi-annually when held to maturity!

During April, women volunteers all over America will be calling on business and professional people to enroll them in the Bond-A-Month Plan. If you are self-employed, enroll in the plan—a sure, safe savings system designed especially for you!

Peace is for the strong! For peace and prosperity save with U.S. Defense Bonds!

The U. S. Government does not pay for this advertisement. It is donated by this publication in cooperation with the Advertising Council and the Magazine Publishers of America



AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan Avenue
Detroit 21, Michigan

CLEEREMAN LAYOUT DRILLING MACHINE

A Modern solution to an Old Problem—

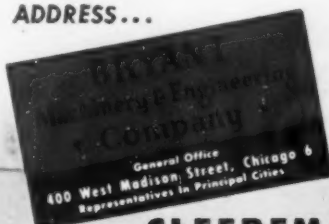
A large portion of tools, dies, jigs, fixtures, molds, jig-less production and other jobs do not require the ultra-precision of a Jig Borer. The Cleereman Layout Drilling Machine has been designed specifically for the efficient handling of this particular work.

Built with many features of design similar to those used in Cleereman Jig Borers, the Layout Drilling Machine is an economical machine capable of accurately locating, drilling, boring, reaming, tapping, etc., with the utmost of operator ease, at a fast rate of production over a long period of time.

Cleereman standards of high quality and proven engineering design and material selection have been maintained in every detail.

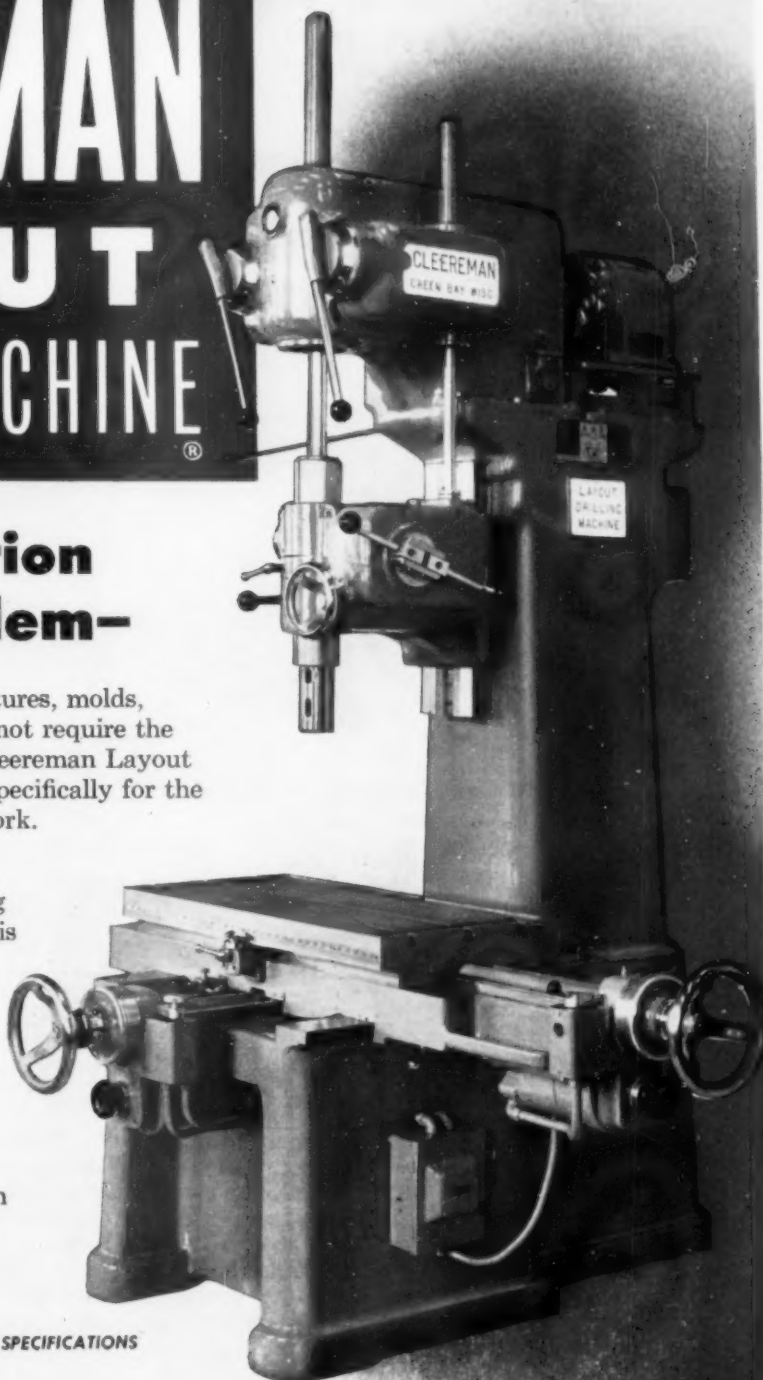
WIRE OR WRITE FOR CATALOG WITH COMPLETE SPECIFICATIONS

ADDRESS...

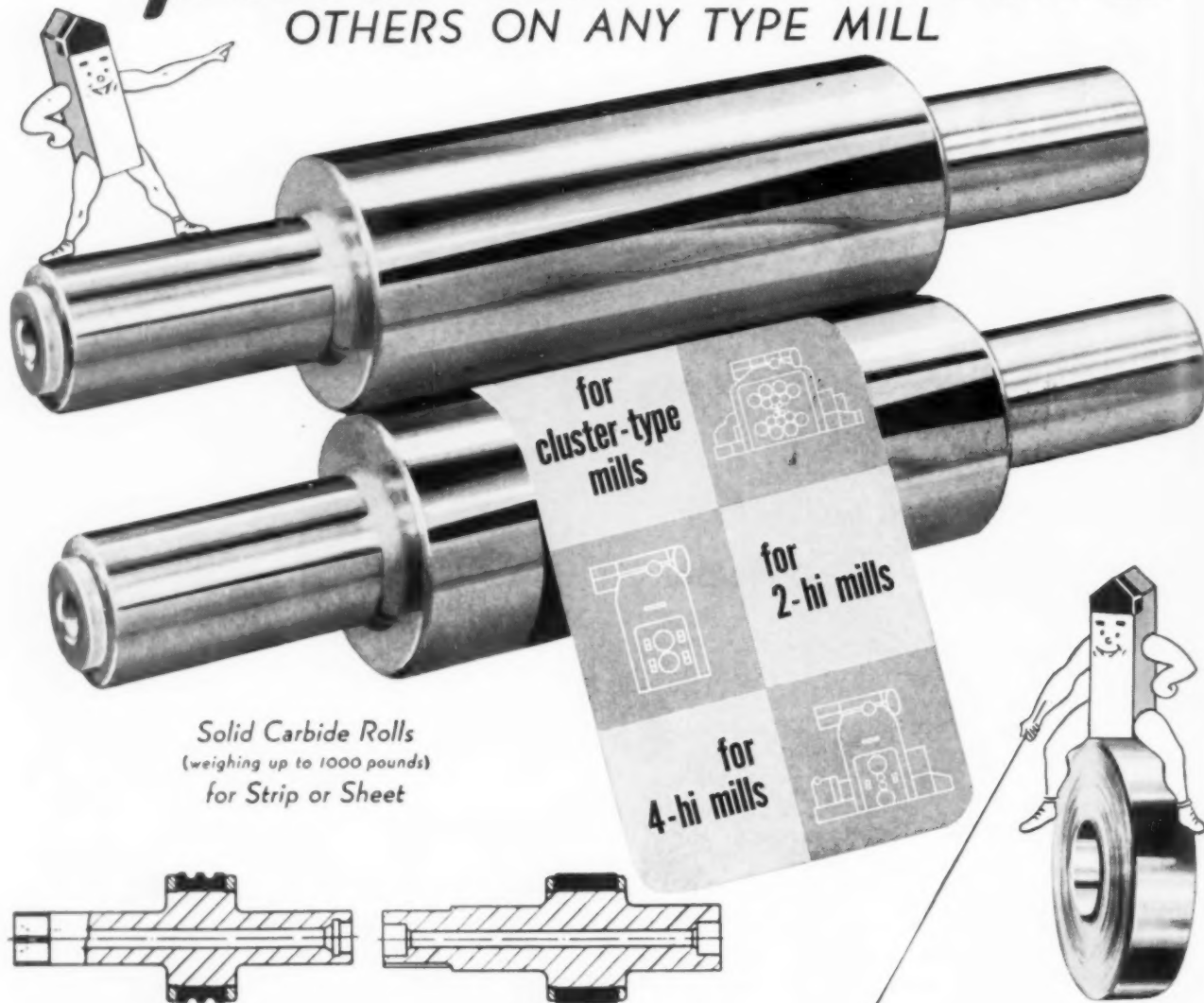


... Affiliated with..

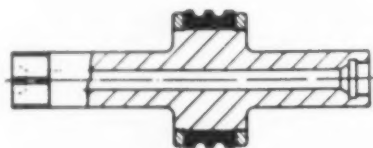
CLEEREMAN MACHINE TOOL CO. Green Bay, Wisconsin
BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES



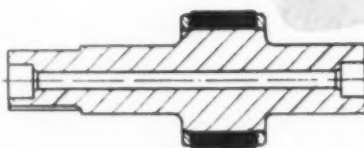
Talide Rolls... OUTPERFORM ALL OTHERS ON ANY TYPE MILL



*Solid Carbide Rolls
(weighing up to 1000 pounds)
for Strip or Sheet*



FOR SHAPE WIRE



SLEEVED ROLLS FOR FLAT WIRE

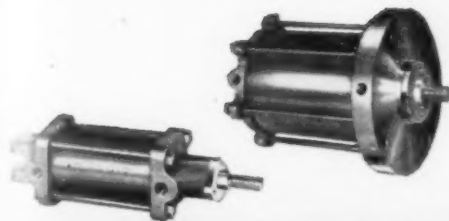
Solid Talide Carbide Rolls are generally used for cold rolling carbon, alloy, spring, razor, silicon, stainless and other analyses of strip steel. They are being used satisfactorily as either idle or driven rolls. For cold rolling flat or shape wire from round wire, or when rolling metal tinsel or ribbon, a carbide sleeve is usually press fitted to a steel arbor. Talide Rolls can be produced in diameters up to 24" and lengths up to 40".

There are actually 14 specific advantages obtained in operation and product by using Talide (Tungsten Carbide) Rolls. Chiefly, Talide Rolls outlast steel rolls from 50 to 1 on low carbon steel to 15 to 1 on high alloys and stainless. You can make greater reductions per pass, operate at higher speeds and impart a smoother, brighter finish. Blanking die life is increased and plating costs reduced. Metal Carbides Corporation, Youngstown 7, Ohio.



*Ask for our
Talide Roll
Catalog CR-50*





Pneumatic Cylinders

Really complete, the Hannifin line of pneumatic cylinders is made with two types of pistons . . . bores from 1" to 16" . . . six standard mountings. Really standard, these cylinders are tooled to tolerances that assure accurate mounting to make assembly to your machines easier. Really built, each cylinder is "TRU-BORED" and honed, piston rods are ground and polished, interchangeable end caps, heavy duty tie rods . . . rugged, yet precision construction throughout!

Write for
Bulletin 210



NOW...
HANNIFIN HAS THE
MOST COMPLETE LINE
OF AIR CONTROL
EQUIPMENT!

NEW! REVOLUTIONARY HANNIFIN P-M Pilot-Master Valves

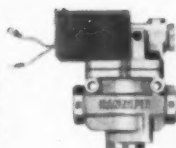
Piston-operated poppet design. Exclusive replaceable cartridge for easier maintenance. Speeds to 600 cycles per minute. Pressure from 15 to 150 p.s.i. Integral, solenoid-controlled pilot heads or a choice of 10 separate pilot valves for remote control.

- Fewer Valves to Stock
- Fewer Parts to Stock
- Maximum Interchangeability
- No Springs in Main Valve

Write for Bulletin 231.

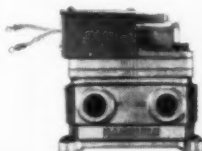
2 and 3-Way Valves.

Same valve operates 2-way or 3-way, normally open or normally closed. $\frac{3}{8}$ " to $1\frac{1}{4}$ " I.P.S.

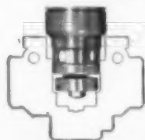


4-Way Valves.

Two 3-way valves mounted in compact, common body. Two piston poppets. Two cartridges. $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " I.P.S.



EXCLUSIVE REPLACEABLE CARTRIDGE



AIR WARDEN

Air filters, pressure regulators and lubricators to protect air operated equipment. Bulletin 1010B.



Disc Type Air Control Valves

Designed for smooth, positive and accurate control of air-operated equipment. Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation. Sizes: $\frac{1}{8}$ " to $1\frac{1}{4}$ " I.P.S.

Write for Bulletin 57-W



Hannifin "Directair"
electrically controlled
air-operated disc valve

Foot-operated
treadle valve
(Also spring return
and rotary types)



Standard hand
control valve
(Single or duplex)

HANNIFIN

Hannifin Corporation, 1119 S. Kilbourn Ave., Chicago 24, Ill.

Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

WRITE FOR
BULLETIN
No. 521

WESSON'S

New

HUSKI-CUT

Finger Grip Holder



Use heavier feeds.
Use higher speeds.
Cut grinding cost.
Eliminate shank grinding.
Eliminate brazing of tips.
Cut replacement costs.
For heavy duty and extra
heavy duty jobs.
Tested and proven on produc-
tion lines throughout industry.



**GUARANTEED INDESTRUCTIBLE
IN ORDINARY USE**

THREE STANDARD TYPES

FORTY STANDARD SIZES

WESSON COMPANY • FERNDAL, MICHIGAN

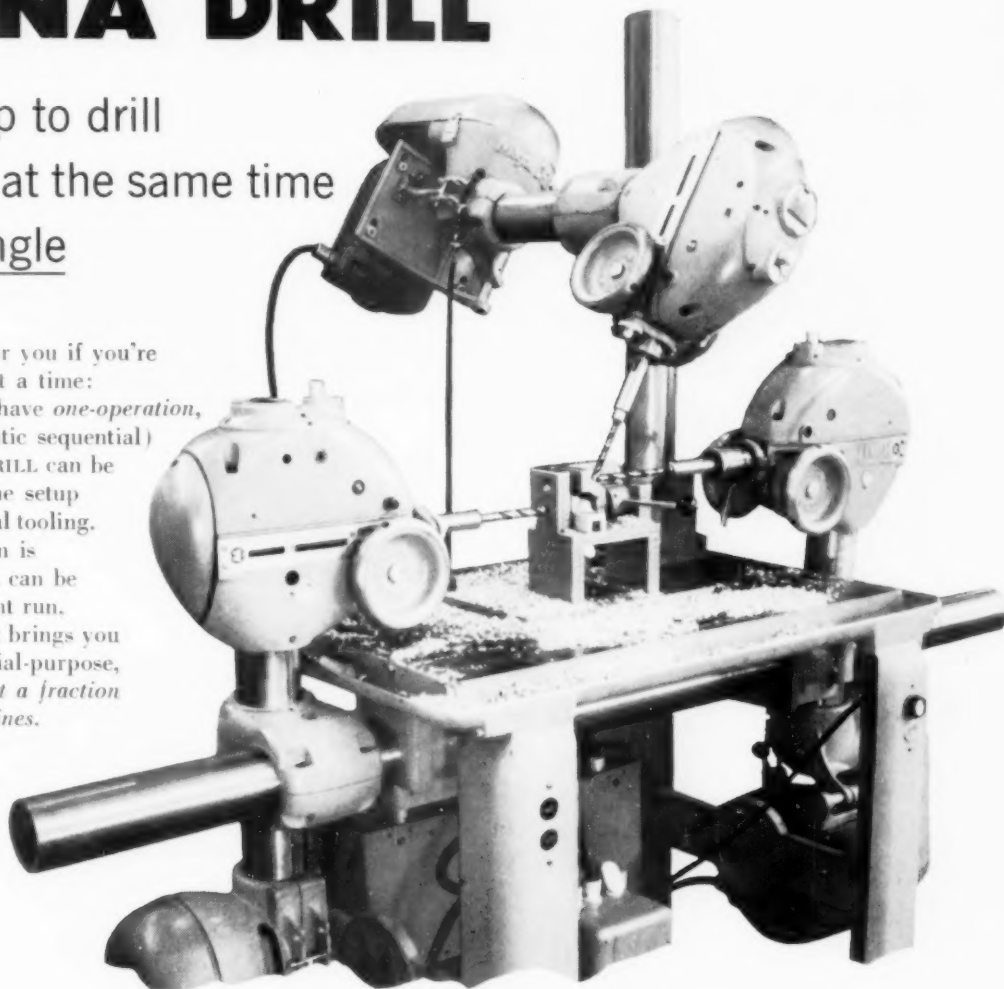
AFFILIATED WITH
WESSON METAL CORP.
LEXINGTON, KENTUCKY

The one quick way to build a machine around any part...

MAGNA DRILL

Easily set up to drill
many holes at the same time
from any angle

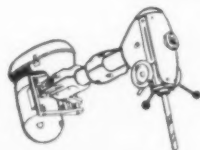
Here's important news for you if you're still drilling holes one at a time: With MAGNA DRILL you have *one-operation, simultaneous* (or automatic sequential) drilling! And MAGNA DRILL can be quickly changed from one setup to another, without special tooling. When one production run is completed, MAGNA DRILL can be made ready for a different run, overnight if necessary. It brings you all the economies of special-purpose, custom-built machines, *at a fraction of the cost of such machines.*



MAGNA DRILL is your only *completely universal* drilling machine. Any number of independently powered heads can be mounted quickly and accurately for simultaneous drilling. Each head has its own speed, feed and drilling angle... can perform any operation possible with a conventional drill using 1-hp. motor and 5" stroke.

See MAGNA DRILL demonstrated—if only to learn about its many cost-cutting features—how it can be fitted to any number of drilling operations on *your* production line. The coupon below will bring you complete information about this versatile machine, including specifications, technical data and the name of your nearest distributor.

MAGNA DRILL MODULAR COMPONENTS—KEY TO COMPLETE VERSATILITY

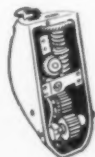


DRILL HEADS Standardized, adjustable heads can be indexed and locked at any angle or position *without special tools.* Variable throat. Right or left hand manual feed. \$265*

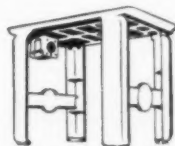


COLUMNS and BASES Line-bored cast iron; can be mounted horizontally or vertically. $\frac{3}{4}$ " walls, $3\frac{1}{2}$ " precision-ground tubes support drill heads. \$45*

*Delivered to your plant



POWER FEED (Mechanical Type) Attaches to MAGNA DRILL head in a few minutes. Feed rates .003" to .012" per rev. Solenoid engage. Spring return. Automatic cycling. \$175*



TABLES Drilled and tapped for mounting heads in variety of positions and for ganging tables in multiples. Single table, 24" x 20", \$179*. Double table, 24" x 40", \$220*



MAGNA ENGINEERING CORPORATION
Dept. K-242, at factory nearest you:
12819 Colt Rd., Cleveland 8, Ohio, OR
Menlo Park, California

- ☐ Please send more information about MAGNA DRILL.
☐ Please have representative call

Name _____

Position _____

Company _____

Address _____

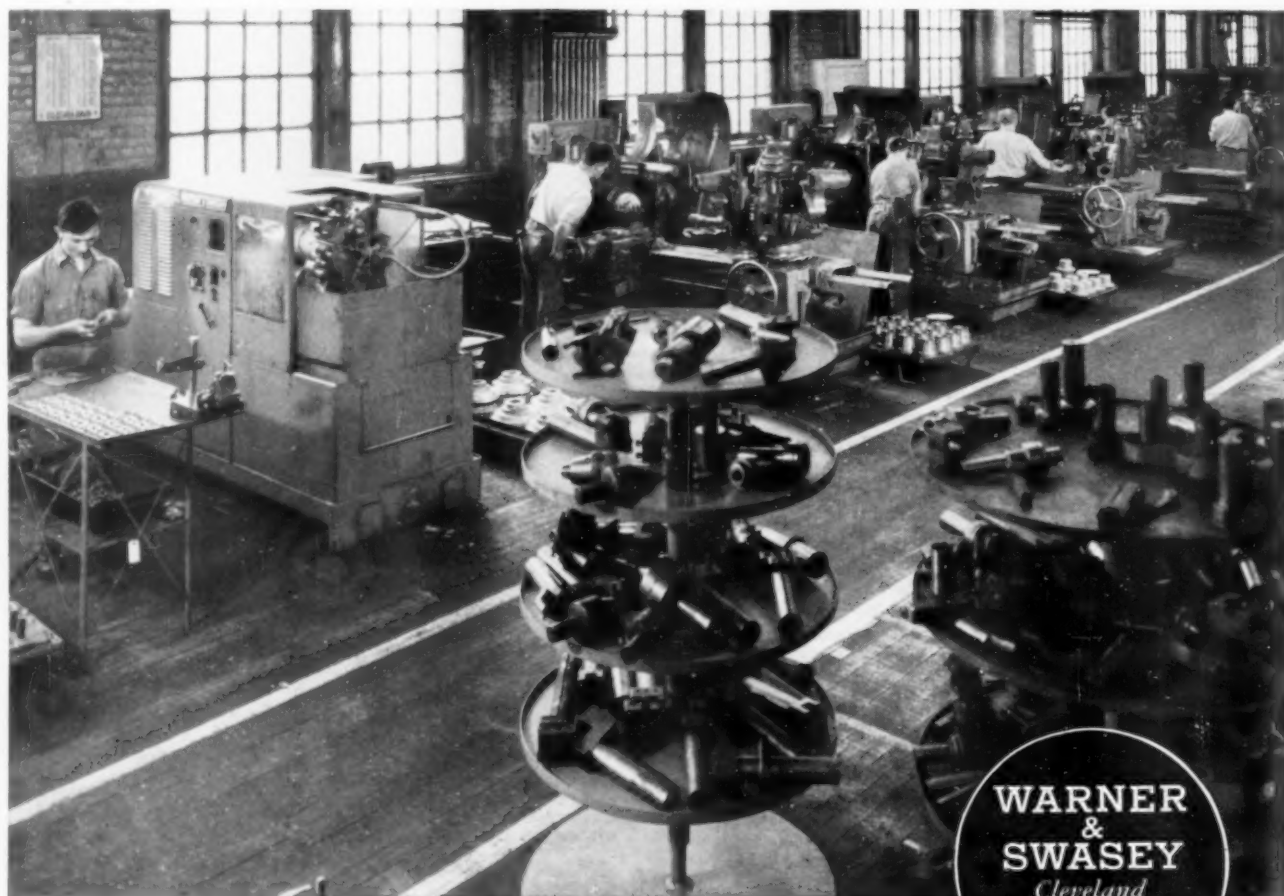
**What's
wrong
with this
picture**

● Nothing at all! But chances are any veteran shop man will instantly ask, "What's the idea of having an 'Automatic' in the turret lathe department?"

The "idea" is simply this: Warner & Swasey 1-AC Single Spindle Automatics can handle many of your regular small and medium lot runs *more profitably* than your hand-operated machines.

That's because the 1-AC operator can change setups quickly for the job at hand. There are no cams to change—he simply re-adjusts trips for feed, speed and stroke controls. And, on certain jobs, one man on a 1-AC can turn out more work, of more uniform accuracy, than two men on hand-operated machines.

To find out whether 1-AC Single Spindle Automatics fit into your production picture, call in your nearest Warner & Swasey Field Representative. He'll study your jobs and methods and advise you correctly.



**WARNER
&
SWASEY**

Cleveland

PRECISION
MACHINERY
SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY



*All Hands are
"TOP HANDS"*

...when they work with **SIMONDS** "RED END" Hacksaw Blades

It's fast, easy cutting on any material . . . when the hand-frame holds the right "Red End" Blade for the job. That's why those who know, insist on the blade with this famous trade-mark.

On the economy side, Simonds "Red End" Blades are uniformly hardened for better cutting performance and lowest cutting costs. What's more, teeth are accurately milled and precision-set . . . for straighter

cutting and longer life. And Simonds offers a choice of three types of blades — Standard, Molybdenum or High Speed Steel — Hard Edge or All Hard — to provide a "right" blade for your job.

Get delivery from stock from your Simonds Distributor.

For PROMPT DELIVERY and PERSONAL SERVICE
... call your INDUSTRIAL DISTRIBUTOR



Factory Branches in Boston, Chicago, San Francisco and Portland, Oregon. Canadian Factory in Montreal, Que.
Simonds Divisions: Simonds Steel Mill, Lockport, N. Y., Simonds Abrasive Co., Phila., Pa., and Arvida, Que., Canada

Hardness testing made Easy!

Save Time!
Test Accurately!

Ames PORTABLE HARDNESS TESTERS

Frequent hardness testing of metals before and during fabrication and after heat treating is essential today for best results.

Ames Portable Hardness Testers answer the need for a light weight, accurate, dependable tester that may be carried to the work for on-the-job testing. They are easy to use, require no skill, and get speedy, accurate tests wherever the work may be—no delays, no cutting off specimens—no waiting for laboratory tests.

Besides testing flats, rounds, tubing, etc. Ames Hardness Testers make tests that otherwise would be impossible, such as large gears, knives, saws, blades, struts, frames and assembled parts. Thousands are in use paying for themselves over and over again in time and materials saved.

Send for literature or ask for demonstration
in your plant. No obligation.



AMES PRECISION MACHINE WORKS

Makers of Ames Precision Lathes and Bench Millers
Waltham 54, Massachusetts

USE READER SERVICE CARD; INDICATE A-5-216-1

Note This AMAZING INCREASE in PRODUCTION When Using the M-B JUNIOR Pneumatic GRINDER



"In one of the applications, where M-B Grinders are employed, (using a $\frac{3}{8}$ " dia. Tungsten Carbide Burr with $\frac{1}{4}$ " shank) the following improvement in production took place. Previous to the application of our Junior Pneumatic Grinder, it took 7 girls 8 hours to turn out 200 pieces. Now 1 girl is turning out 1600 pieces in an 8-hour period."

The above record was made in a plant of one of our country's largest manufacturers. Although there had been a general overhauling of their procedure, the greatest part of this improvement was credited to the use of M-B Junior Grinders. Your production can likewise benefit by the use of these modern M-B devices. Write for Literature.

Also Automatic Air Line
Filters, Regulators
and Lubricators

M-B PRODUCTS
46 VICTOR AVE.
DETROIT 3, MICH.

USE READER SERVICE CARD; INDICATE A-5-216-2

DYKEM STEEL BLUE

STOPS LOSSES

making dies
& templates

Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout show up in sharp relief and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2303D North 11th St., St. Louis 6, Mo.

USE READER SERVICE CARD; INDICATE A-5-216-3

KAUFMAN TAPPING MACHINES BUILT FOR SPECIFIC PRODUCTION JOBS



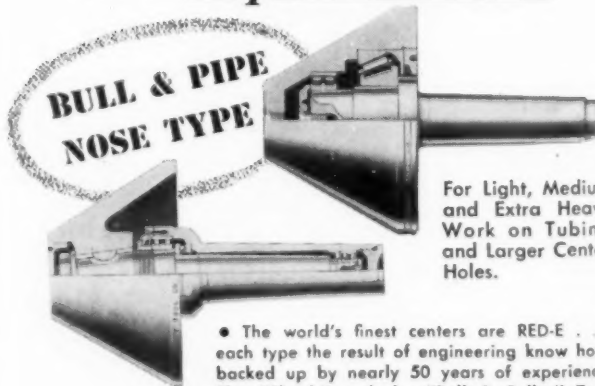
Kaufman specializes in tapping machines—every machine precision-built to meet the requirements of individual production jobs. Designed with fully automatic cycle, single or multiple spindle heads and other most advanced features.

Write for complete information

KAUFMAN MFG. CO.
Manitowoc • Wisconsin

USE READER SERVICE CARD; INDICATE A-5-216-4

only RED-E Anti-Friction CENTERS are Superaccurate!



For Light, Medium
and Extra Heavy
Work on Tubing
and Larger Center
Holes.

• The world's finest centers are RED-E... each type the result of engineering know how, backed up by nearly 50 years of experience. The "Shank" and the "Ball & Roller" Type centers illustrated are just a few of over 200 exclusively designed centers available.

Ask for Catalog "B" (Pipe and Bull Nose Centers), "C" (Anti-Friction Centers), "D" (High Speed—Carbide Tipped Centers).

CENTER Specialists Since 1908

RED-E TOOLS **READY TOOL COMPANY**
558 Iranistan Ave. • Bridgeport 5, Conn.
USE READER SERVICE CARD; INDICATE A-5-216-5

The Tool Engineer

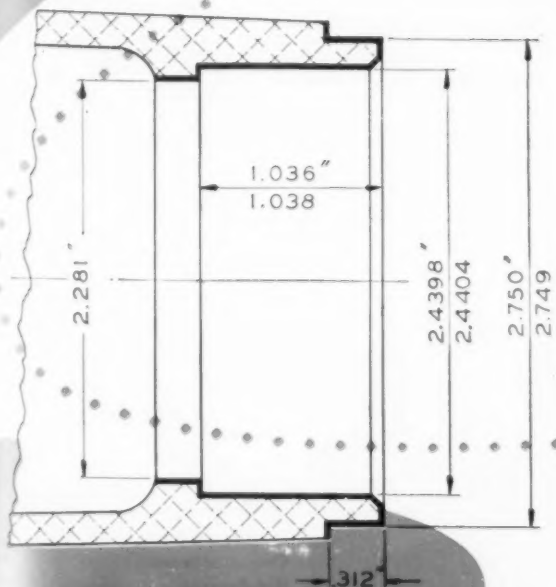
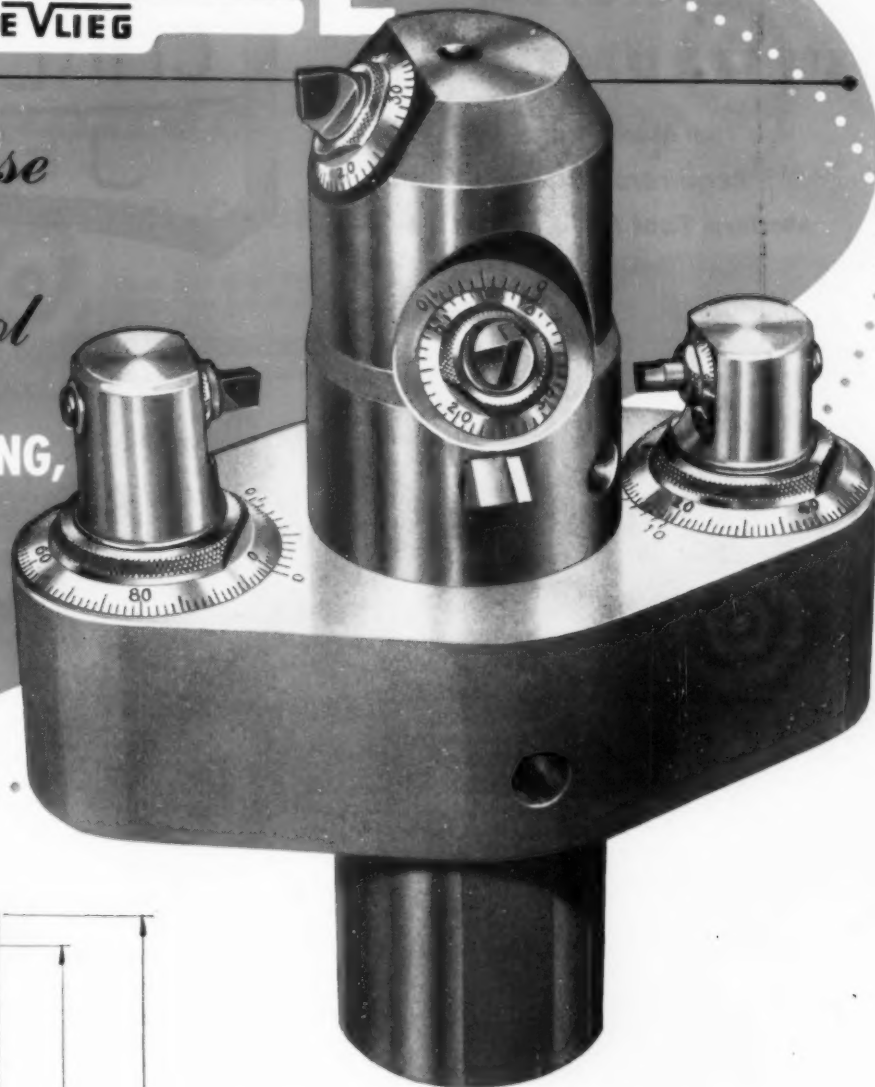
MICROBORE

by DEVLIEG

PATENT NOS. 2,330,692
2,537,517

... THE
*Multi-purpose
single point
adjustable tool*

for
**PRODUCTION BORING,
TURNING and
FACING
OPERATIONS.**



**SURFACES MACHINED
ARE INDICATED
BY HEAVY LINES**

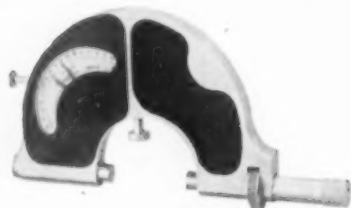
Illustration shows typical example of cluster tooling using standard Microbore units for machining seven surfaces on a main bearing housing at one pass. Each tool is independently adjusted by proven micrometer vernier principle and precise limits of accuracy are maintained on production runs.

DEV LIEG MICROBORE COMPANY

480 Fair Avenue • Ferndale 20, Michigan, U. S. A.

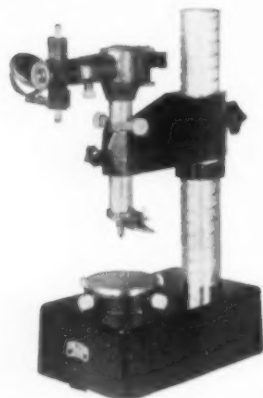
PRECISION INSTRUMENTS

*for the Most Exacting
Requirements in
Modern Tool Engineering
and Production*



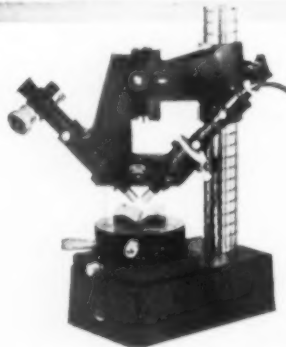
PASSAMETER

Adjustable indicating snap gauge. Scale reads to .0001 in. Range $\pm .0035$ in. Even pressure constantly maintained.



OPTIMETER

An optical precision indicator for checking dimensions by comparison with a standard gauge. Scale reads to .00005 in.

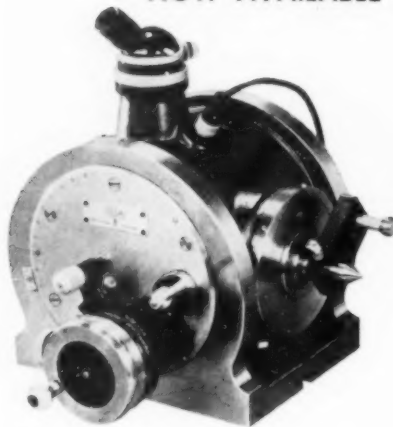


**SURFACE
FINISH
TESTER**

Optical slit microscope. For gauging the form, depth and frequency of tool marks on machined surfaces.

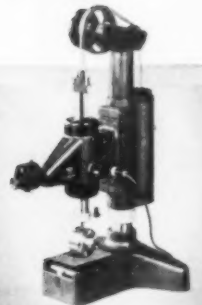


NOW AVAILABLE



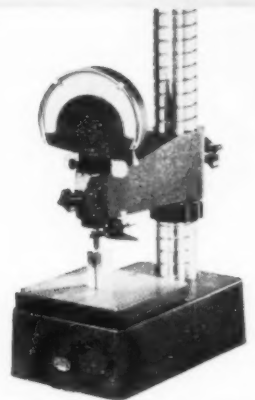
New Model
OPTICAL DIVIDING HEAD

Precision scale reading to 10 sec. of arc. Special presetting device. Sturdy construction—usable on a surface grinder or miller under heavy strain. Reinforced spindle. Precision spindle bearings. Improved microscope for convenient reading in any spindle position.



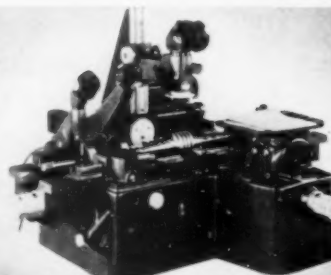
**ABBE
METROSCOPE**

Direct measuring optical instrument. Ultra precision scale and spiral microscope. Measuring range 0 to 200 mm. (0-8 in.) Reads to 1 μ .



ORTHOTEST

Precision indicating instrument. For checking dimensions by comparison with a standard gauge. Scale reads to .00005 in. Range $\pm .004$ in.



UNIVERSAL MEASURING MICROSCOPE

For any and all types of measurements. Ultra precision glass scales with spiral microscopes. Measuring range: main slide, 0 to 200 mm (0 to 8 in.) Cross slide, 0 to 100 mm (0 to 4 in.) Reads to 1 micron.

Indicating Micrometers
Optical Universal Bevel
Protractors
Shop Microscopes
Toolmakers Microscopes
Interference Comparators
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For further information, consult
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ERCONA CORP.

Exclusive American Representatives for Carl Zeiss, Jena

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Scientific Instrument Division

527 Fifth Ave., New York 17, N. Y.

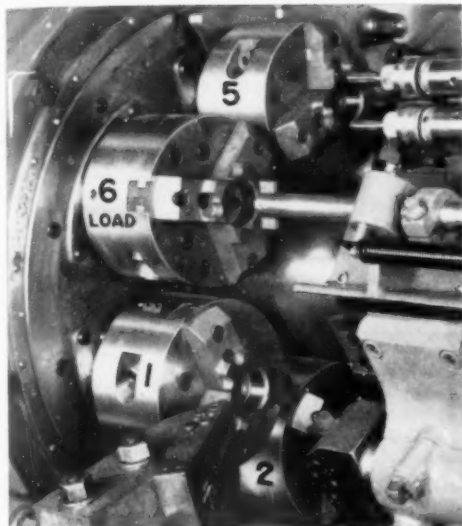
ASK

BAIRD

ABOUT IT!

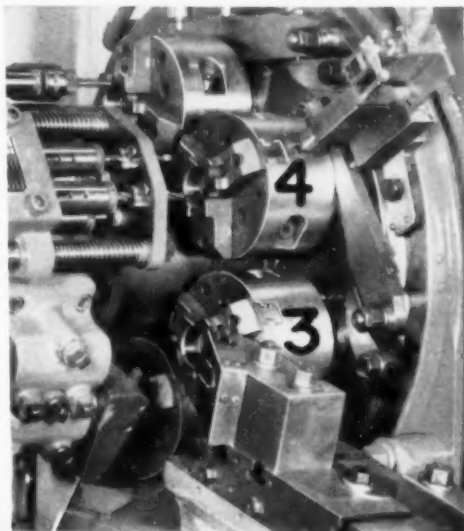
HIGH PRODUCTION TOOLING

A BAIRD CASE HISTORY



View of machine from front.

- 1 Finish turn flange O.D. (3.44"). Rough turn hub dia. Rough face flange and hub.
- 2 Chamfer I.D. Chamfer flange dia. and hub.
- 3 Finish turn hub, finish face flange and hub.
- 4 Drill and c'sink 4 holes — $23/64"$ dia. drill x $29/64"$ dia. C'sink, sub land drills. (Work held stationary when drilling.)
- 5 Tap 4 holes $7/16"$ — 14NC — 3. (Work positioned, held stationary, lead screw operated.)
- 6 Unload and load.



View of machine from rear.

The part . . .
before and after machining.



PRODUCTION

Cycle time 23.12 seconds per piece.
Gross production 155 pieces per hour.

FINISHING A CAST IRON PULLEY HUB...

Here's another example of the way a single Baird High Production Machine can be tooled to handle a series of operations ordinarily not considered practical on a single spindle automatic unit. Note that, in addition to the usual concentric operations being performed on this hub, we are drilling, countersinking, and tapping accurately located bolt holes in the hub flange at just two stations in the cycle and at a very satisfactory production rate for the whole operation. Photographs show the tooling and relative simplicity of the set-up.

And, as in the case of all Baird No. 76 Chucker installations, this one is conspicuous for smoothness and dependability of everyday performance. Automatic chucking frees operator's hands for efficient, easy feeding. Automatic safeguards prevent damage to work, machine, or injury to operator in case of incorrect loading. Spindle speeds are independently adjusted to best performance of the individual operation.

To step up speeds, quality of work, reduction in costs, check the Baird Chucker. "Ask Baird about it."

the **BAIRD MACHINE COMPANY**
STRATFORD • CONNECTICUT

**AUTOMATIC MACHINE TOOLS • AUTOMATIC WIRE & RIBBON METAL FORMING
MACHINES • AUTOMATIC PRESSES • TUMBLING BARRELS**

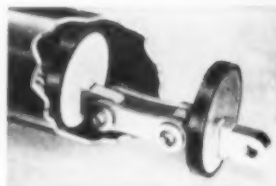
18A53

May, 1953

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-219

219

want to show your
management some
BIG SAVINGS?
Install Hapman
TUBULAR CONVEYORS



**FOR METAL CHIP AND
DUST REMOVAL ON
3 TYPES OF
INSTALLATIONS:**

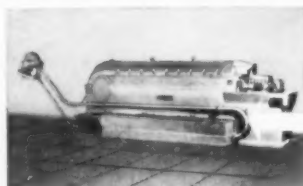
**DEPARTMENT OR PLANT-WIDE
CHIP-CONVEYING SYSTEMS...**

Here's the latest of many complete Hapman chip-handling systems installed in major automotive plants. In all cases, they've *proved* their ability to pay big dividends fast.



**AS ORIGINAL COMPONENTS ON
NEW MACHINES AND EQUIPMENT...**

You can get low-cost, *auto-matic* chip, dust or sludge removal on new machines of many types by specifying Hapman Conveyors as original equipment. We co-operate with the tool builder.



**ADDED TO EXISTING MACHINES
OF MANY TYPES...**

You can also show your Management important, quick-return savings by installing Hapman Conveyors on existing equipment such as these profile milling machines — or on broaching machines, grinders, drills, quench tanks, etc. You can *prove* the savings —



INVESTIGATE NOW — WRITE FOR BULLETIN TE-553

Hapman CONVEYORS, INC.
DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

USE READER SERVICE CARD; INDICATE A-5-220-1



**RING
PUNCHES**

HARD...

tough...

concentric...

Precision-made of both Carbon Vanadium and high carbon, high chrome steels. Available in a wide range of stock sizes from 1/32" to 1" point diameters in increments of 1/64" for immediate delivery. Decimal sizes to order for delivery within 48 hrs.

Button Dies

Ring Type or Press Fit

Hole tapered to eliminate slug jamming. Sizes in stock to match punch sizes.



Write TODAY for your copy of handy data sheets covering specifications and prices; also name of distributor in your area.

Exclusive Distributor Wanted for California

Ring Punch & Die Co.

108 FOOTE AVE., JAMESTOWN, N. Y.
USE READER SERVICE CARD; INDICATE A-5-220-2

CORNELIS

**THREAD
GENERATING
MACHINE**



Cuts screw threads, lead screws and worms by an improved generating method. The principle employed differs considerably from the conventional method of thread milling, lathe turning, or die chasing and will be of interest to anyone requiring work of greater accuracy and better finish, as well as higher production.

WRITE FOR ILLUSTRATED FOLDER

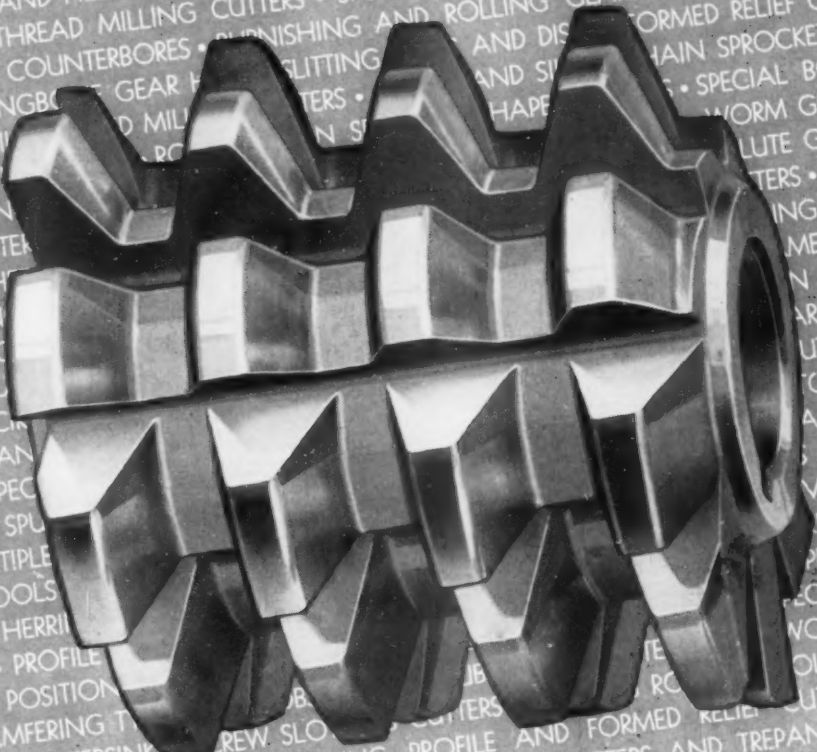
GEORGE SCHERR CO., Inc.

COMPLETE LINE OF PRECISION INSTRUMENTS

200C LaFayette St. • N. Y. 12, N. Y.

USE READER SERVICE CARD; INDICATE A-5-220-3

FOR THOSE TOUGH *Special* JOBS ...DEPEND ON **National Tool Co.**



● Years of successful experience in *special* tooling and related production problems are yours for the asking. When the job requires *special* cutting tools call in your National Tool Co. representative. He is backed by more than 46 years experience in the engineering and manufacture of *special* cutting tools. His assistance is yours, without obligation, whether you're interested in one tool or a complete tooling program.

Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry

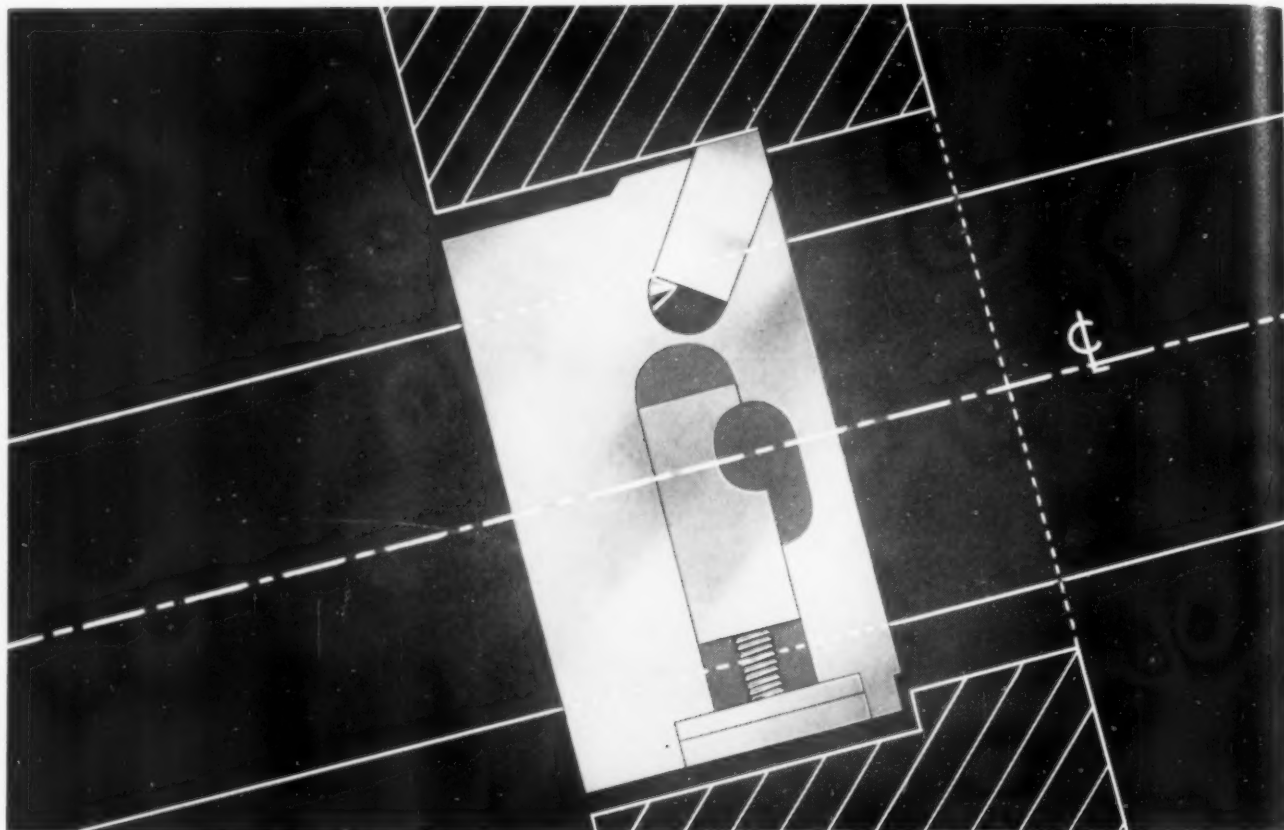


National

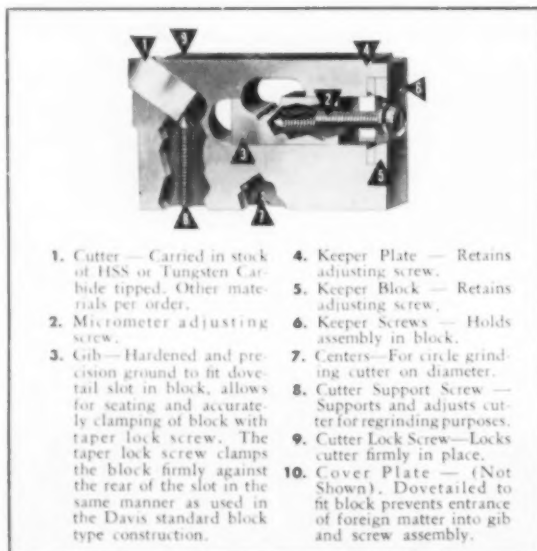
TOOL CO.

Cleveland 2, Ohio

Get fast, positive line boring accuracy for 2½" to 17" dia. with ...



DAVIS SINGLE CUTTER MICROMETER ADJUSTABLE BLOCKS



1. Cutter — Carried in stock of HSS or Tungsten Carbide tipped. Other materials per order.
2. Micrometer adjusting screw.
3. Gib — Hardened and precision ground to fit dovetail slot in block, allows for seating and accurately clamping of block with taper lock screw. The taper lock screw clamps the block firmly against the rear of the slot in the same manner as used in the Davis standard block type construction.
4. Keeper Plate — Retains adjusting screw.
5. Keeper Block — Retains adjusting screw.
6. Keeper Screws — Holds assembly in block.
7. Centers — For circle grinding cutter on diameter.
8. Cutter Support Screw — Supports and adjusts cutter for regrinding purposes.
9. Cutter Lock Screw — Locks cutter firmly in place.
10. Cover Plate — (Not Shown). Dovetailed to fit block prevents entrance of foreign matter into gib and screw assembly.

HERE's the way to boost efficiency on general purpose jobs that demand rigidity and a wide range of cutter adjustments.

In addition to regular line boring with either standard or special bars, Davis tools with the exclusive adjustable feature are easily adapted to counterboring, undercutting, grooving, facing or chamfering. Block and cutter adjust as a unit to assure full cutter support at all settings.

Made of high grade tool steel, hardened and ground, the blocks can be furnished with High Speed Steel, Cobalt, Stellite, Tungsten Carbide tipped or Tantalum Carbide tipped cutters.

For details, write for bulletin No. 602.

If Davis can't bore it, it can't be done!

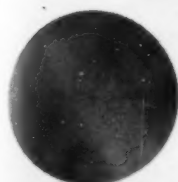
DAVIS BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WISCONSIN



Builders of plain and micrometer adjustable block type boring tools; line boring bars; special boring tools; car wheel boring tools; planer, vertical boring and turning mill tools; Quick Change arbors and sleeves.

"SEE US AT THE CANADIAN INTERNATIONAL TRADE FAIR—TORONTO, JUNE 1 TO 12"



BLANK



CUP



FIRST
DRAW



SECOND
DRAW



THIRD
DRAW



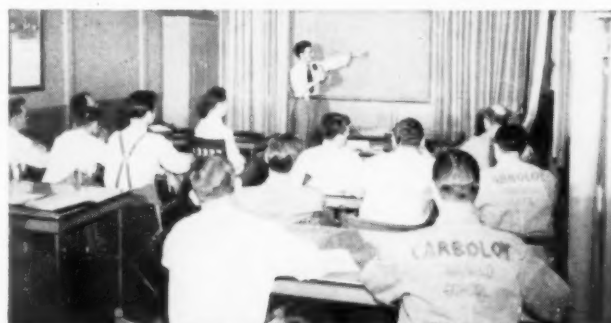
FOURTH
DRAW

Currently, draw dies of Carboloy cemented carbide are speeding up production on everything from shoe eyelets to .30 cal. brass cartridge cases and 155 mm. brass and steel shell casings. Send coupon for details on carbide draw dies.

Carbide dies outdraw steel dies 10 to 20 times on shell cases



Field engineering — At your call, a Carboloy die expert will drop around to your plant and help solve your carbide die problems. Call him whenever you want on-the-spot answers on design and application of carbides in dies.



Die training school — Courses in design, application and maintenance of carbide dies are given free at Carboloy Die School. Plan to enroll your men now. Send coupon for information.

Dies equipped with Carboloy cemented carbide really stand up in production of steel shell cases. Even under terrific hour-after-hour continuous drawing, they wear 10 to 20 times longer than steel dies and deliver an extremely high finish.

Other drawing applications — similar benefits.

Such benefits are not unusual from Carboloy drawing dies. On some applications, they'll outwear other dies by 50 to one. The same holds true for blanking, forming and piercing dies made of Carboloy cemented carbide.

Naturally, when dies wear like this, you get greater production with less downtime and maintenance . . . fewer rejects and less finishing . . . cash savings all down the line.

Whether you make or use press dies, simple or complex, for any die operation, explore the possibility of applying Carboloy cemented carbide to those dies. You can order Carboloy cemented carbide in finished or in rough form from Carboloy Department. On blanking dies, order rough carbide direct from Carboloy Department to be finished in your own or tool maker's die room. Expert Carboloy die specialists will assist you in carbide die design and application.

To get a better idea of the wide range of carbide dies and free Carboloy die services, send coupon.

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DEPARTMENT OF GENERAL ELECTRIC COMPANY

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Mail Today**

"Carboloy" is the registered trademark of the Carboloy Department of General Electric Company

Carboloy Department of General Electric Company
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- ☐ Rush me free Carboloy Die Engineering Manual D-124.
- ☐ Send complete details on Carboloy Die School.
- ☐ Have a Carboloy field representative call at my plant.

Name _____ Position _____

Company _____

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City _____ Zone _____ State _____

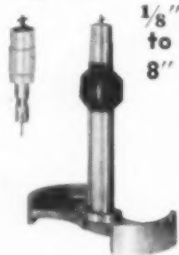
"Packaged Precision"



Measures high-precision holes to fractions of .0001", with these advantages—

Here in a compact self-contained unit, you have the high precision that has found so prominent a place in the jet engine program. By unique design, Comtorplug gives true 2-point gaging, self-aligned and centered. Thus it enables you to check any part of a hole—including very bottom—detecting out-of-round, front or back taper, bell mouth, etc.

- There are no gimmicks to get out of order, such as wiring, hose or electronic gear. And because self-contained Comtorplug has none of these, and no heavy base, it is instantly usable anywhere: machine, bench, or lab.
- Shows actual measurement to fraction of .0001", and is "just right" for Statistical Quality Control programs.
- No skill needed to use it accurately—built-in features and 10 minutes instruction do the trick.
- Marvelous thing about Comtorplug from production man's viewpoint is that you can put it to work in your shop without any planning, wiring, air lines or rigmarole—just a simple briefing on its use.
- Comtorplug is a rugged, shock-proof instrument. Use it for size control at the machine as well as bench inspection, wherever you produce precision holes in volume.



Request Bulletin 46



COMTOR CO.

69 Farwell St.

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SINCE 1901
MOLINE "Hole-Hog"
SPECIALLY DESIGNED
MACHINE TOOLS

have cut production costs for American Industry.

DRILLING • BORING
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FINEST IN ...
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MILLED STUDS
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To Obtain Further Information About
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Handy Readers Service Card on

Page 139

JONES & LAMSON GUARANTEES CLASS III THREADS with REPETITIVE ACCURACY!

J & L Automatic Opening Die Heads are sold with this guarantee: that your threads will be held consistently within the exacting Class III tolerances for form, lead and pitch diameter, throughout the long life of the J & L chasers.

Some of the reasons why:

COMPACT, RUGGED DESIGN GIVES MAXIMUM SUPPORT TO THE CHASERS. J & L Dies are made of solid steel, no built-up sections, hardened and precision ground throughout. Chasers are supported at the point of, and in the direction of, maximum strain.

THREAD FORM, HELIX, PRECISION POINT HEIGHT, ARE ALL GROUND INTO CHASERS AFTER HARDENING.

This gives you a freer cutting tool, operating with minimum wear and repetitive Class III accuracy. The high precision of the J & L chasers is maintained in the Die by exclusive chaser holding features.

EASY, CONTROLLED RESHARPENING. J & L chasers are resharpened independently of the holders or dies. Instructions are simple, easy to follow. Eliminates guesswork. Exclusive holding features assure accurate resetting.



Only J & L Die Heads and Chasers give you ALL these features. Write to Dept. 710 for illustrated catalogs and complete information.



RADIAL CHASER TYPE
Capacities from #8 to 4 1/4"

TANGENT CHASER TYPES
Stationary and Revolving. Capacities from #4 to 2"

JONES & LAMSON

Machine Tool Craftsmen
Since 1835

JONES & LAMSON MACHINE CO., 518 Clinton St., Dept. 710, Springfield, Vt., U.S.A.



DIE HEAD DIVISION



Prove It To Yourself!

**...You Can Now
Obtain Precision
Flatness, Finish
and Parallelity
in Production
Quantities**



Many manufacturers of pumps, compressors, valves and other equipment containing liquids or air under high pressures are now using production lapping to great advantage—have eliminated gaskets in mating surfaces, have improved product performance. This has been made possible through the extreme accuracy of work produced by the Lapmaster in production quantities. Micro-inch finishes of 2 to 3 RMS are common. Surface flatness can be held to less than .0000116".

Use Our **Free Laboratory Service** *to Determine Your Exact Needs*

To determine whether lapping can be practical and profitable for you, we maintain a laboratory for lapping sample parts. If you believe it offers possibilities we invite you to send prints of the parts, together with surface finish requirements and production desired. In addition send several parts for test lapping. We can then give you the facts on what you can expect from the Lapmaster. There is no obligation for this service.



Crane Packing Company, Dept. TE-5, 1823 Belle Plains Avenue, Chicago 13, Illinois

CRANE PACKING COMPANY

A TYPICAL CASE



Four Model 72" Lapmasters were installed in an automotive plant for lapping the joint faces on large castings. These Lapmasters are able to keep pace with the high production requirements of automotive plants because there is no downtime required for reconditioning the lapping plate. In addition, parts lapped by the Lapmaster

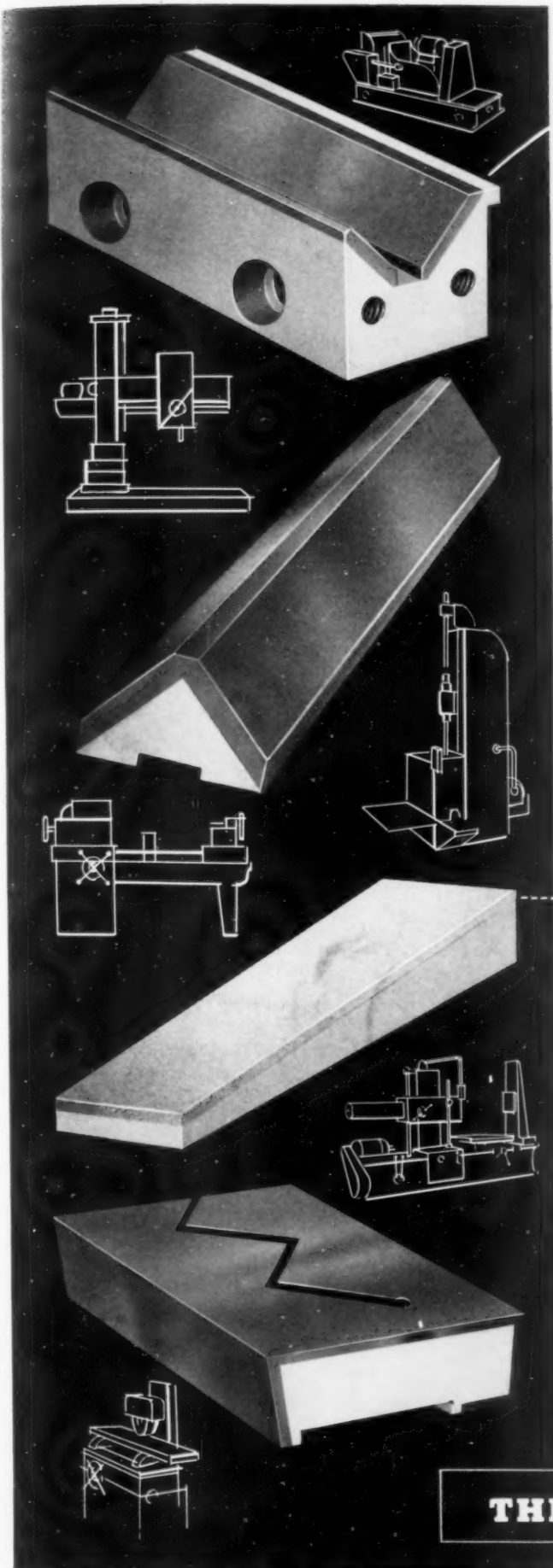
can be brought directly from the milling operation to lapping. Intermediate grinding operations are eliminated. Still another important feature is the fact that joint faces are lapped so accurately, gaskets can be eliminated in final assembly; the resulting metal to metal contact also eliminates distortion caused by the conventional use of gaskets.

Additional Data

on the complete line of Lapmasters is available on request, also new information on Measuring Flatness.

Write for your copies today.





it's

OK

let'em go with OK hardened ways, gibs, ball races, and Ampco^{*} bronze wear strips

The ultimate success and accurate life of your machine depends to a large extent on the accuracy, and uniform high hardness of its ways, gibs, ball races or wear strips. OK parts are the finest. They are made of special tool steel welded to a backing of soft tough steel under 2500 tons pressure, then hardened to a Rockwell C-65-66 and ground to tolerances of $\pm .00015$ (both straight and parallel). They are available in all sizes and shapes, to meet your particular requirements.

OK wear strips are now available in welded Ampco bronze. Because of the OK's special bi-metal method of welding, less bronze is required. These ways are ground to close tolerances thus reducing manufacturing and assembly time.

Mail coupon below for comprehensive bulletins.

**Manufacturers for the Metal Working Industry of
Slitter Knives, Shear Blades, Rotary Shear Knives,
Hardened Spacers, Hardened Ways, Gibs, Ball Races,
Bronze Ways, and Wear Strips.**

*Reg. U. S. Pat. Off.
by Ampco Metal Inc.



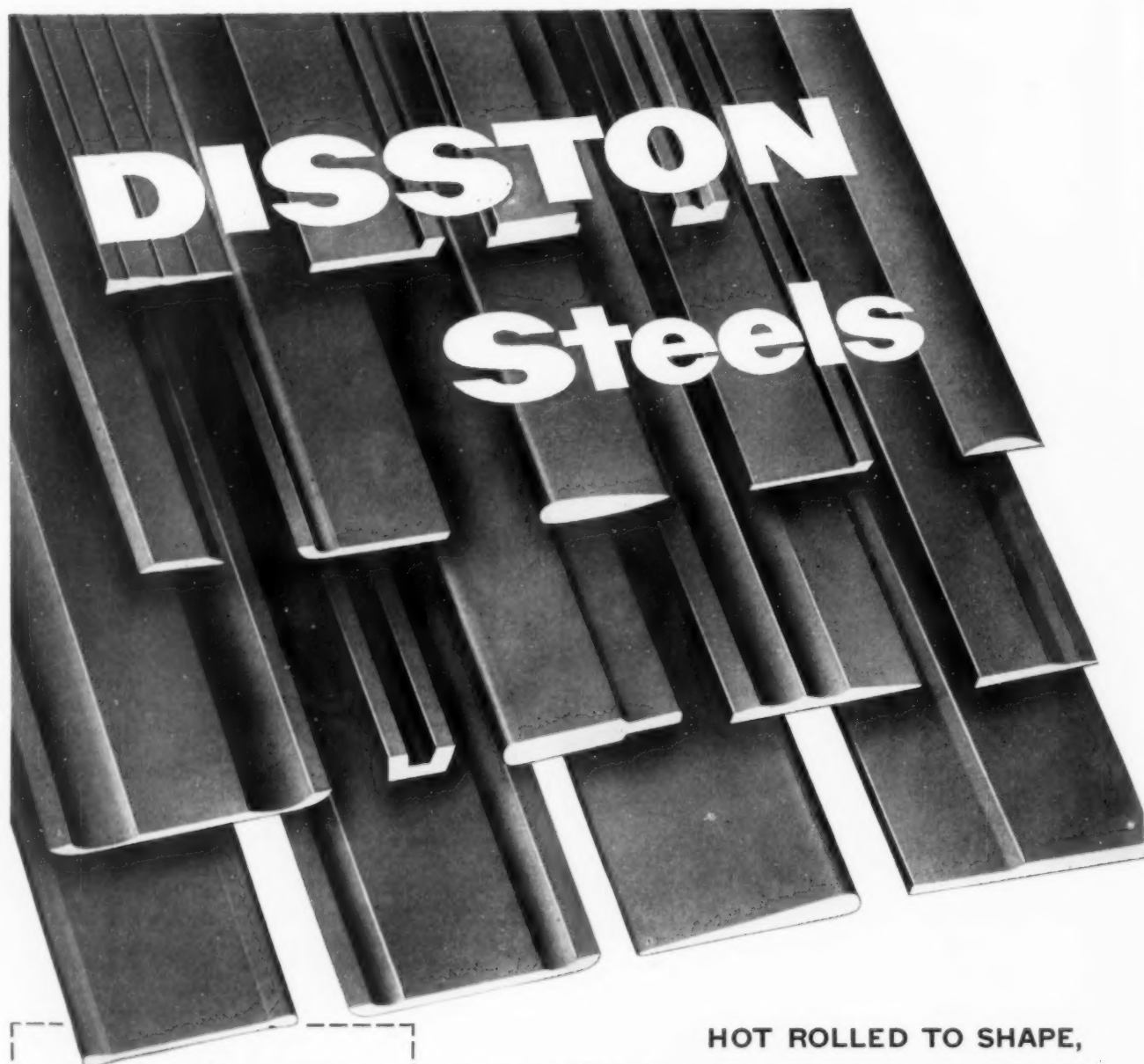
**OHIO KNIFE CO., DEPT. U,
Cincinnati 23, Ohio**

Please send free Bulletins on
OK ways, gibs, etc.

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THE OHIO KNIFE CO.

CINCINNATI 23, OHIO



A few of the many forms of Disston Hot Rolled Shapes now being used in industry.

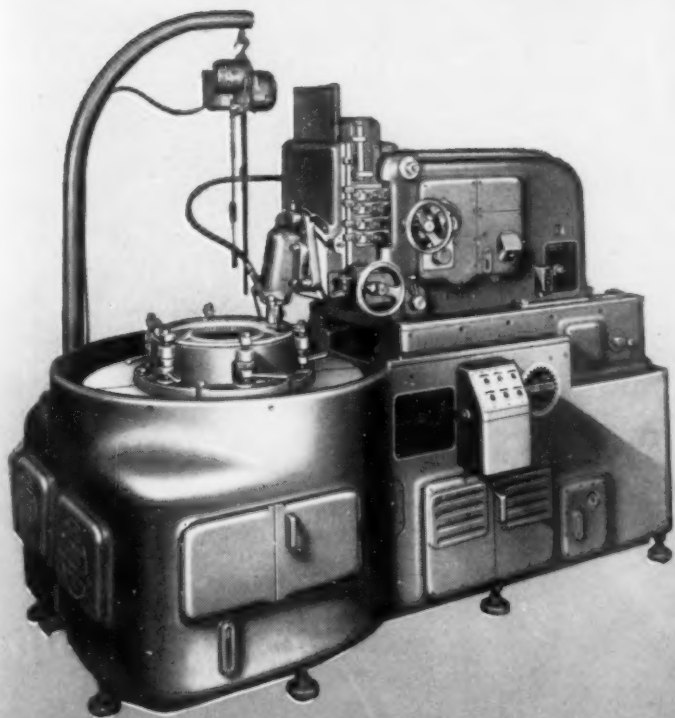
HOT ROLLED TO SHAPE, GIVE YOU A PRODUCTION HEAD-START

It may be money-saving news to you that Disston can relieve you of much of the overhead in machining by delivering Disston Hot Rolled Steel Shapes to meet or closely approximate your specifications. These steel- and labor-saving shapes can be rolled in a variety of forms that should easily offer production short-cuts to you. Tolerances are close, and finishes are exceptionally fine. Disston Shapes can be made in either alloy or carbon steels, both electric and open hearth grades. Disston engineers and metallurgists are ready to work with you today. Write us, giving your needs.

HENRY DISSTON & SONS, INC.

119 Tacony, Philadelphia 35, Pa., U.S.A.



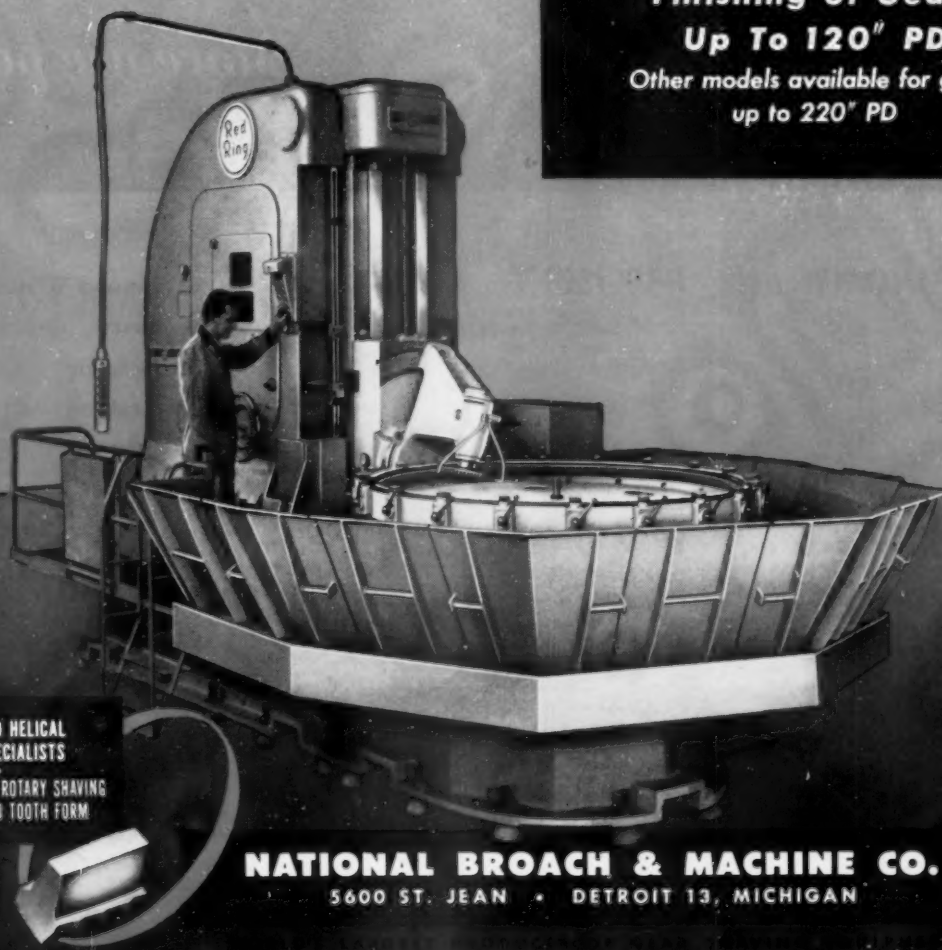


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*For the Precision
Finishing of Gears
Up To 120" PD*

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GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING
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Manhattan Diamond Wheels—More use per dollar

Manhattan Diamond Wheels—More use per dollar

Manhattan Diamond Wheels—More use per dollar

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FOR ECONOMY AND PRECISION . . . specify Manhattan Diamond Wheels . . . and see why Manhattan leads the field. For carbide, quartz, synthetic sapphire, and soft or hardened steel . . . for internal, surface, and cylindrical operations, Manhattan Diamond Wheels give you the fastest, coolest cutting. One reason — Manhattan's special resin bond which resists loading or glazing when used against carbide tipped tools with steel shanks . . . makes dressing or lapping unnecessary. When you specify Manhattan Diamond Wheels, you are buying **MORE USE PER DOLLAR . . .** lowering costs . . . building profit.



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MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY
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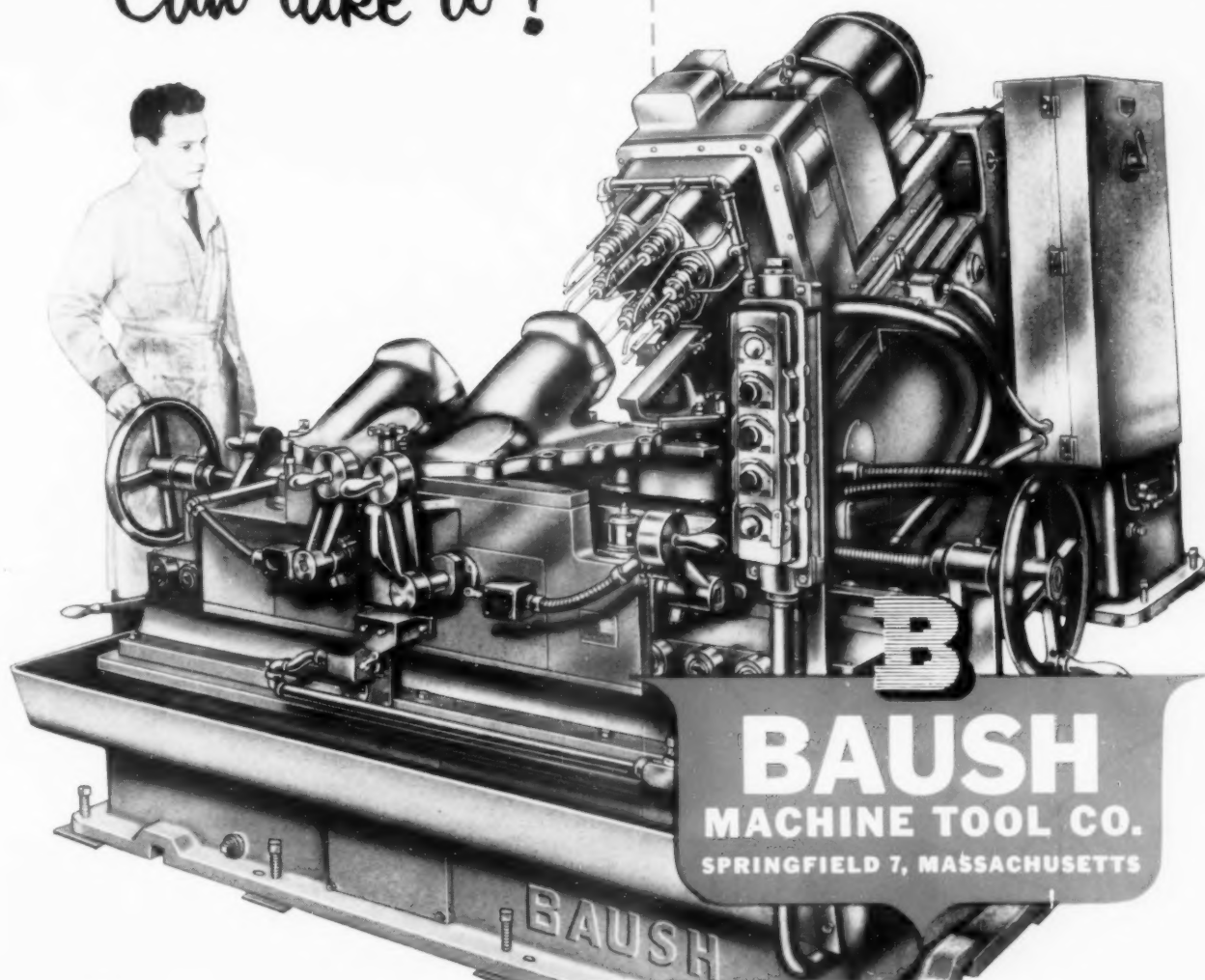
tapping cast steel plate
is tough, rugged work

but...

BAUSH

MACHINE TOOLS

Can take it!



Plants working on heavy armored units for defense find that the inherent rugged quality built into every Baush machine tool for more than fifty years, meets every demand they have for producing results that are uniform, economical and free from troublesome and costly breakdowns.

This unit illustrated is a Baush Special Angular Individual Leadscrew Tapper arranged for tapping holes in both upper and lower bosses of CAST STEEL housings. Furnished with a six (6) spindle fixed-center individual leadscrew tapping head mounted on a hydraulic slide (for approach and return of head), that makes two passes to complete the tapping of six (6) $\frac{1}{2}$ x 13 in two different height bosses of each part.

Both machine and fixture can accommodate two different housings.

Parts are loaded into fixture proper, locating from two movable pins that enter reamed construction holes in the flange and are clamped down with planer type clamps. The fixture slide is located by hand-operated shot bolt that is interlocked electrically. Slide operates by screw and hand wheel.

BAUSH
MACHINE TOOL CO.
SPRINGFIELD 7, MASSACHUSETTS



AMERICAN'S "KING SIZE"
SELECTION HAS ELIMINATED
50% OF OUR SPECIALS!



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DRILL JIG BUSHINGS

SAVE YOU TIME AND MONEY

50% of your specials are now American's standards. The new standard sizes are listed in our new catalog. In addition, all lengths are now standard with American (no added charges). Our KING SIZE selection of standard types and sizes are immediately available to you through our fully stocked exclusive Distributors — no waiting! SPECIFY AMERICAN.

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NEW
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NOW!

TRADE MARK



AMERICAN DRILL BUSHING CO.

5107 PACIFIC BLVD.

LOS ANGELES 58, CALIFORNIA

SPECIALIZING ONLY IN DRILL JIG BUSHINGS
232 FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-232 The Tool Engineer

MULTIFORM

Whatever your metal-cutting or woodworking requirements...

There's a WALKER-TURNER

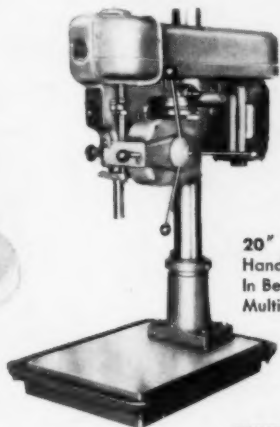
**LIGHT-
HEAVYWEIGHT**

Machine

designed to do the job faster,
at lower investment cost



15" DRILL PRESSES
6" or 4" Spindle Travel
In Bench, Floor (shown)
and Multi-Spindle Models



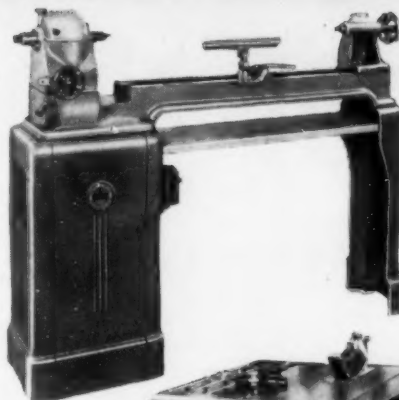
20" DRILL PRESSES
Hand or Power Feed
In Bench (shown) Floor and
Multi-Spindle Models



**RADIAL
DRILLS**



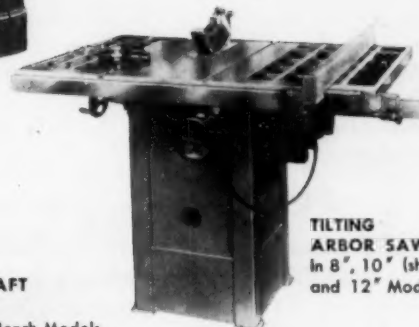
SPINDLE SHAPERS 1 h.p.



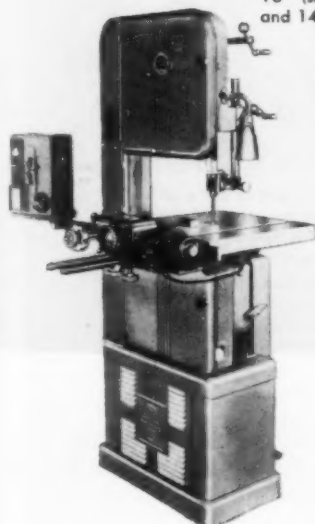
**VARIABLE SPEED
LATHES**



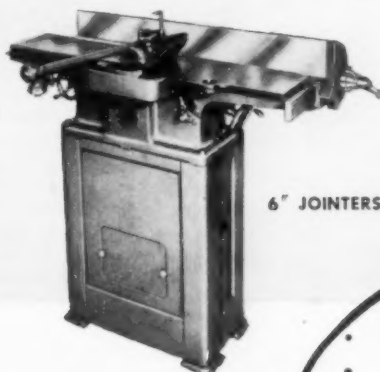
**FLEXIBLE SHAFT
MACHINES**
In Floor and Bench Models



**TILTING
ARBOR SAWS**
In 8", 10" (shown)
and 12" Models



BAND SAWS
Metal and wood-cutting
16" (shown)
and 14" Models



6" JOINTERS

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• DIVISION •

KEARNEY AND TRECKER CORPORATION
PLAINFIELD, N. J.

DRILL PRESSES - HAND AND POWER FEED • RADIAL DRILLS
WOOD AND METAL CUTTING BAND SAWS • TILTING ARBOR SAWS
RADIAL SAWS • JIG SAWS • LATHES • SPINDLE SHAPERS
JOINTERS • BELT AND DISC SURFACERS • FLEXIBLE SHAFT MACHINES

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Walker-Turner Division, Kearney & Trecker Corp.
Dept. T-5, Plainfield, N. J.

(Please write your name and address in margin of page)

Let us Prove . . .

- ★ *Faster cutting, even on hardened steel or abrasive surfaces!*
- ★ *Superior finishes!*
- ★ *Increased production and reduced tool costs!*

Job-engineered for greater production profits!

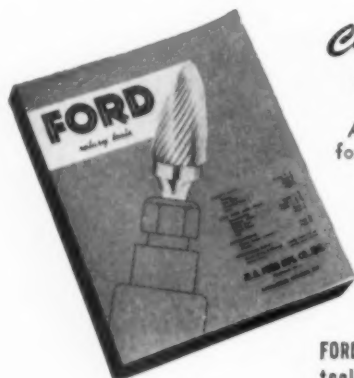
FORD

solid CARBIDE END MILLS

On-the-job tests of FORD solid carbide end mills confirm their superiority! Greater rigidity, job-engineered spiral flutes and cutting edges, and close tolerances all contribute to faster, better production and lower costs. Sizes to 1/2". See new catalogue No. 207.

FORD -- the complete line!

HSS ground cutters, rotary files, countersinks
CARBIDE cutters, end mills, grinding burs



*Complete Details,
Operating Data*

All specifications, plus informative operational data on more than 300 FORD stock rotary tools contained in new FORD catalogue No. 207, just released. Send for YOUR copy.

FORD regrinding service adds new tool life, reduces tool costs!

M. A. FORD MFG. CO., INC.

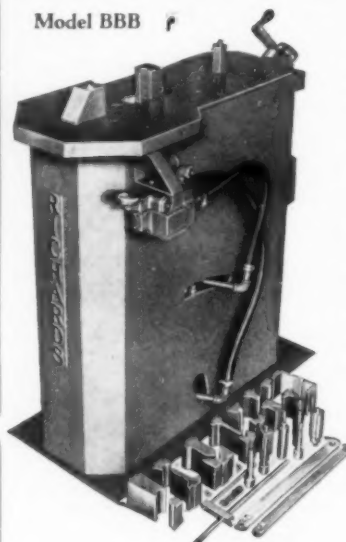
Pioneers in rotary tools for more than 30 years
Davenport 3, Iowa

USE READER SERVICE CARD; INDICATE A-5-234-1

MULTIFORM BIG BROTHER BENDER

**Produces Without Special Tooling—Saves Die Costs
Saves on Expensive Presses**

Model BBB



Illustrated above are a few of the many forms that can be produced efficiently on the Multiform Bender, using the standard tooling.

The heavy duty Big Brother Bender is designed for fabricating bus bars, brackets, fixtures, etc., without special tooling. Air controlled with finger tip response. Comes complete with dies, mandrels and wrenches—punching and blanking dies extra. Will punch holes up to 1" and form material up to 3/4" thick by 4" wide. We also build smaller hand or air operated models for forming up to 3/8"x1 1/2" material.

Send for illustrated folder TE-5

J. A. RICHARDS CO. 903 North Pitcher St
Kalamazoo, Michigan

USE READER SERVICE CARD; INDICATE A-5-234-2

Stadoil
DIAMOND LAPPING OIL

*doubles the life
of diamond
wheels!*



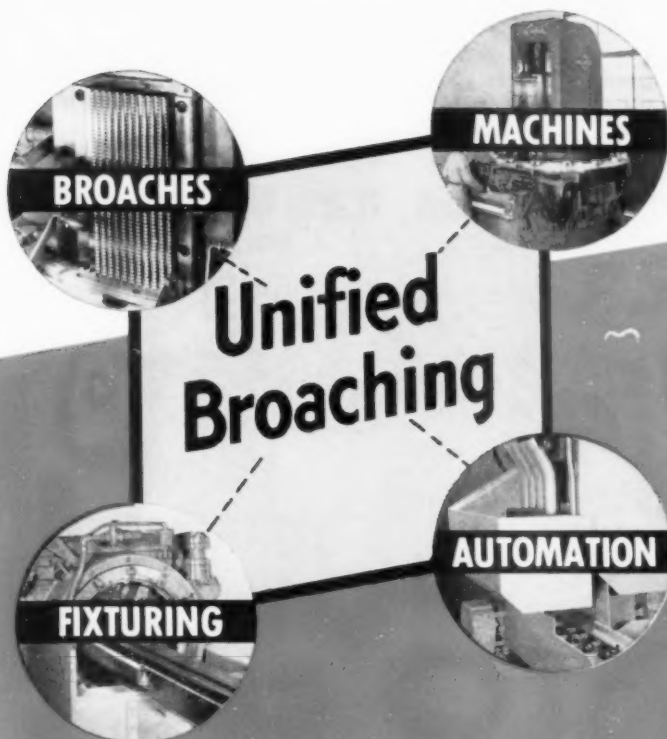
Here's the lubricant that removes all gum or glaze, and keeps wheels from loading. With Stadoil, no pressure is needed in sharpening. Thus, wheels and cutters last twice as long. You get extra fine tool edges, free from scratches.

Stadoil is recommended by all diamond wheel manufacturers for carbide tool grinding. It's also an excellent carrier for diamond dust. Over 6000 industrial users. 18th year. Sold in half-pint to 50-gallon quantities. Order from your industrial distributor, or if he can't supply, order direct from factory.

For information, write Dept. 5

STADOIL MANUFACTURING CO., EL MONTE 3, CALIF.

USE READER SERVICE CARD; INDICATE A-5-234-3

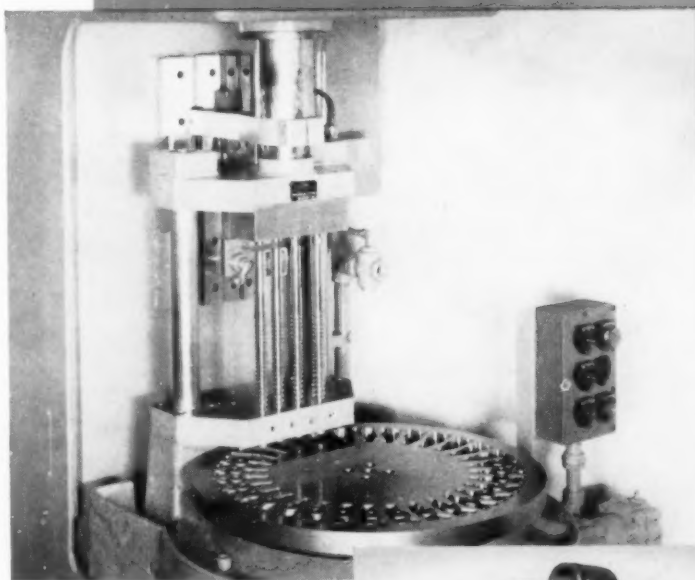


For Lower Costs...

the COLONIAL method

At Colonial, experience, imagination and competence are applied

- 1 to the design and manufacture of each of the individual components of a complete broaching installation, and
- 2 to the effective combining of ALL components into a completely UNIFIED BROACHING installation—making them work as a "team."



Broach 1200 Rocker Arms per Hour

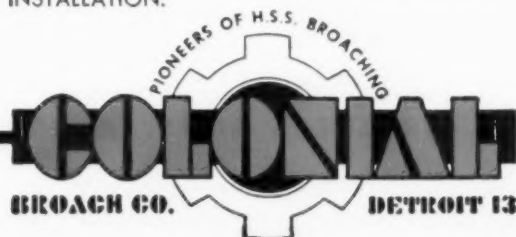
Continuous strip-broaching and burnishing of 1200 automotive rocker arms per hour is achieved with minimum effort by a Colonial 10-ton, 36 in. stroke Utility Press. Operator merely loads fixture as it indexes past him. Broached rocker arms simply drop through slots in indexing table and out of chute.

Rocker arms are broached four at a time, approximately 0.010" stock being removed. Burnishers on the broaches permit fast strip broaching with long tool life.

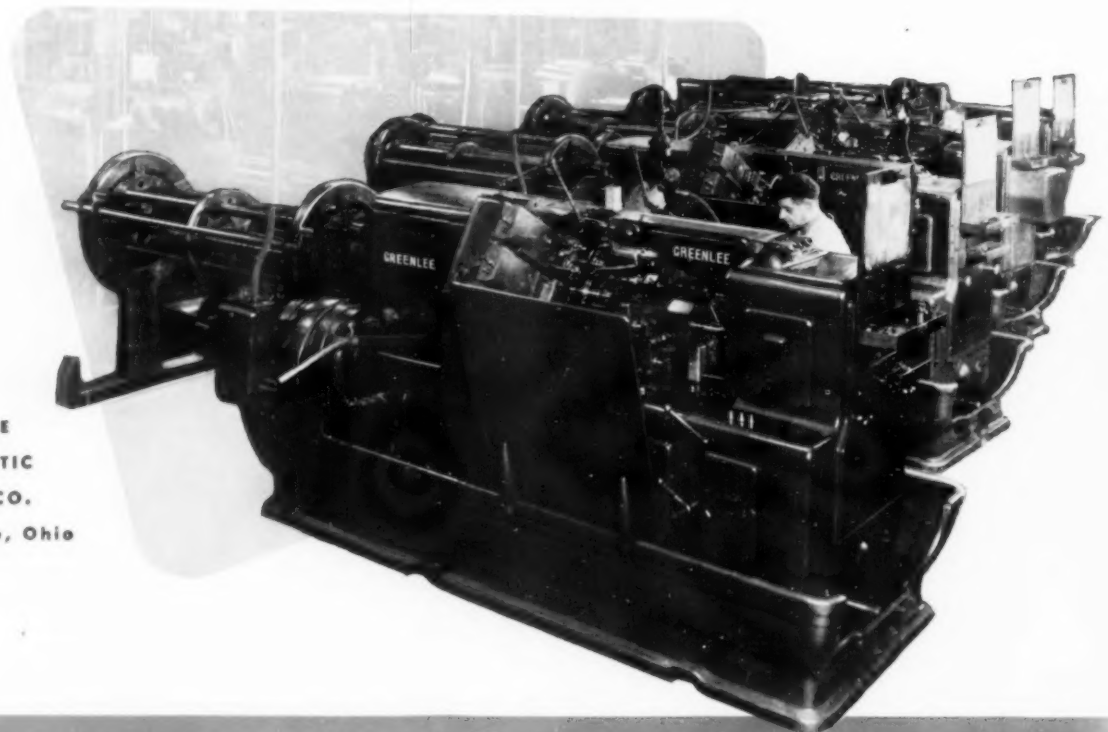
Machines, broaches, fixtures, etc., were all designed by Colonial as a UNIFIED BROACHING INSTALLATION.

WHAT'S AHEAD IN BROACHING?

Keep up with the latest developments: Read "Broaching News". We will be glad to see you get it regularly if you will drop us a line on your company letterhead.



FEATURING
Versatility and Quick Change-Over
ON A WIDE RANGE OF WORK...



DEFIANCE
 AUTOMATIC
 SCREW CO.
 Defiance, Ohio

GREENLEE

Automatics

When our reporter visited the busy shop shown above, he found that the battery of four GREENLEES was used mostly in making parts for "DAS" Unions — a specialty product of the concern. These unions are low-cost pipe fittings, featuring a pressed-insert bronze seat, that will hold pressures up to 300 psi for steam and 750 psi for water. (This high capacity permits distributors to minimize their number of items for a wide range of requirements.) The concern also does a great deal of jobbing work, much of which is now "classified". Owners and operators alike expressed their satisfaction with GREENLEE machines and service, also indicating the GREENLEES are "easier to work on". With their quick change-over features, the GREENLEES are an important factor in holding down costs on the component parts required for the "DAS" Union line.

GREENLEE BROS. & CO.

1985 MASON AVE., ROCKFORD, ILLINOIS



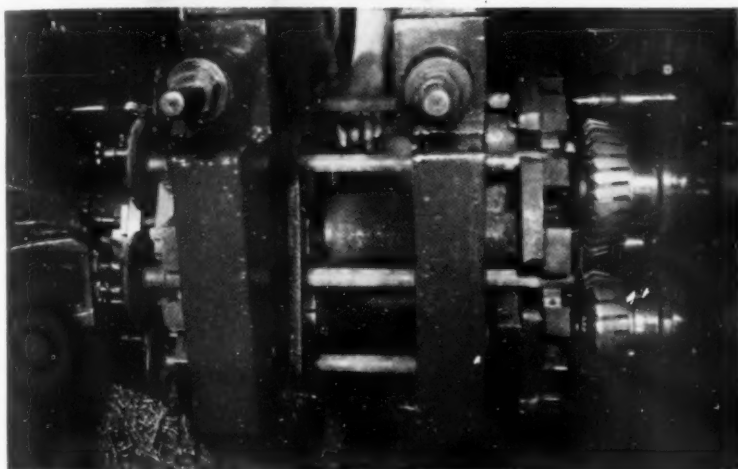
Production-line tooling data for the seat end of a 3/4" "DAS" Union, as run on a 1 1/2" Greenlee Six-Spindle Automatic, is as follows:

Position	Cross Slides	Main Tool Slide
1	Rough Form	Form Drill 1 1/8" dia.
2	Finish Form	Drill 3/8" dia.
3	Knurl	Form Ream
4		Thread 1 1/2" OD
5	Break down part way for cut-off	Tap 3/4" pipe thread
6	Cut off	
Cycle Time — 14 sec.		Production — 257 pcs. per hr.



MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

THERE IS NOTHING HARDER THAN A DIAMOND but **W**ESSONMETAL IS TOUGHER!



ACTUAL JOB Large Automobile Plant

Machine Davis Thompson Milling Machine
Part Rear axle shaft
Operation Rough and finish mill spline end
Material S.A.E. 1038—Brinell Hardness
179-229
Tools Wesson 6" and 8" dia. Milling
Cutters—fine pitch—inserted blade
Speed 8"—387 S.F.M.
6"—290 S.F.M.
Feed 14" per minute
Production . . . 150 pcs. per hour
1500-1700 pcs. per grind
Grade of Carbide . . . Wessonmetal WM

SAVINGS OF OVER \$14,225 PER YEAR ON ONE MACHINE WITH ONE SET OF WESSON TOOLS

OLD METHOD

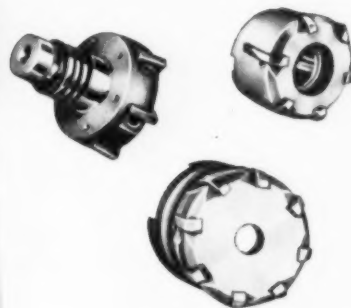
Cost 1 set Inserted Blades \$48.00
Pieces per Grind 275
Grinding Hours per year 10,300
5 Machines Running 3 Shifts
Machine Repair per year \$25,000
Tool Cost per Piece \$0.0545*

NEW WESSON ENGINEERED METHOD

Cost 1 set Inserted Blades \$54.60
Pieces per Grind 1600
Grinding Hours per year 2500
3 Machines Running 2 Shifts
Machine Repair per year \$1200
Tool Cost per Piece \$0.0213*

*(Machine repair and grinding costs not included)

HOW IS YOUR PRODUCTION SCORE CARD!



Write today for folder
on Wesson's
educational, full color,
sound movie —
"This Carbide Age."

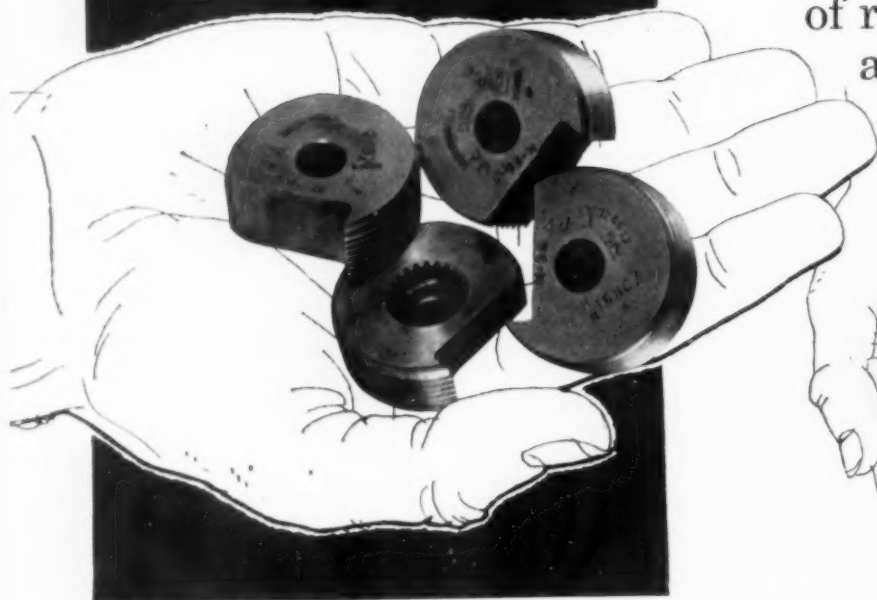
Call Your
WESSON SERVICE ENGINEER—

WESSONMETAL
Cemented Carbide

WESSON METAL CORPORATION
LEXINGTON, KENTUCKY
Affiliated with WESSON COMPANY, Detroit, Mich.

1 SET

of ground thread
circular chasers



cuts more threads...

than 10 SETS
of radial hobbed
and lapped chasers



another reason why so many production shops standardize on

VERS-O-TOOL

with GROUND THREAD CIRCULAR CHASERS

With circular ground thread chasers, you grind 200 times and up—to a full 270° of their circumference; with radial type you average 4 grinds.

With circulars, you vary the grind with the right hook and clearance to suit any material; with radials your grind is fixed, usually limited to one material, one job.

With the circular chaser Vers-o-tool System you use the patented Micrometer gauge—every regrind is identical, insuring precise uniformity of threads. You avoid adjustments, scrap loss and save time—reduce your chaser costs 10 to 1 or better, over radial chasers.

Ask for Catalog DT-52

The NATIONAL ACME CO.

170 East 131st St. • Cleveland 8, Ohio.

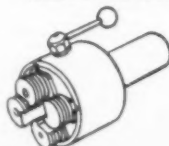
Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing

CHALLENGE TO OBSOLESCENCE

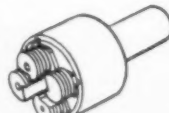
By the time you've used up two sets of circulars you will have saved enough to pay for the entire Vers-o-tool installation.

The difference in life and in performance between ground thread circular chasers and the old conventional type as proved in shop after shop enables us to make this guarantee.

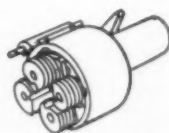
24-hour deliveries on most standard stockable NC and NF chasers and blocks—also National taper pipe and dry seal.



Style DS Vers-o-tool
(Non-revolving Type)
10 Sizes, 1/8" — 6 1/2".



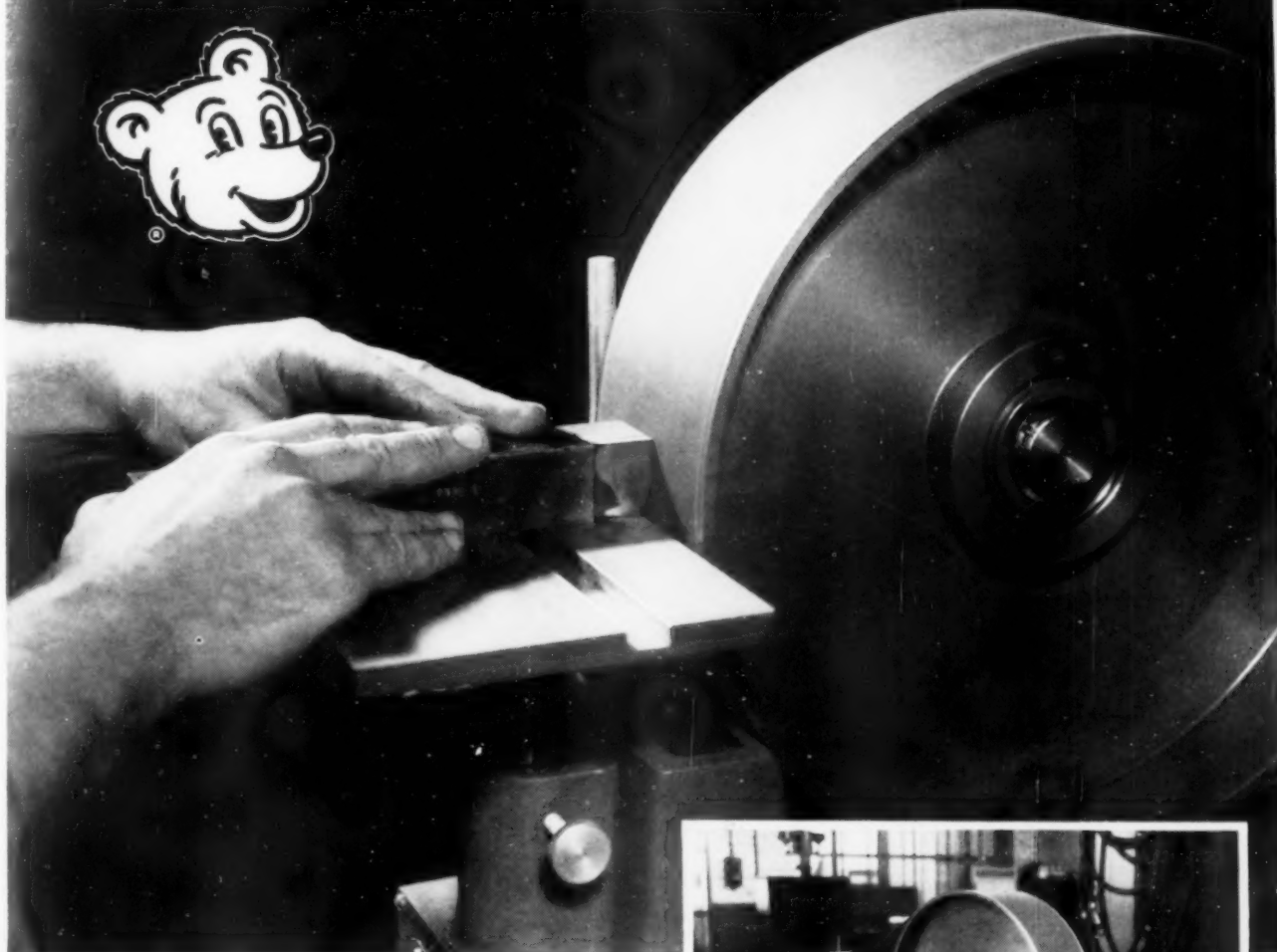
Style DR Vers-o-tool
(Revolving Type)
13 Sizes 1/16" — 6 1/2".



Style DBS Vers-o-tool
(for B&S Automatics)
3 Sizes, 1/4" — 1 1/8".

Ground thread circular chasers and their holding blocks are interchangeable, die size for die size, among all styles of Vers-o-tool automatic heads.

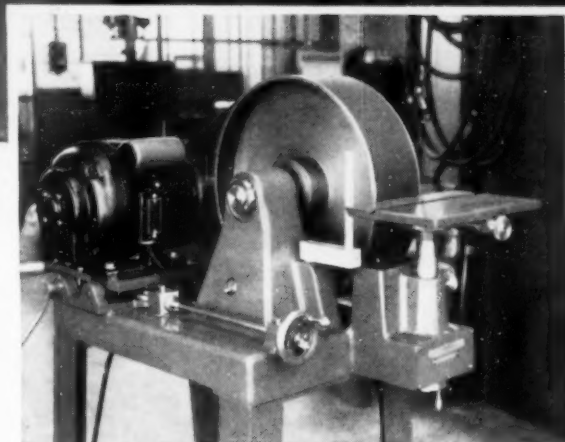
NEW ABRASIVE BELT METHOD BRINGS BIG SAVINGS TO CARBIDE TOOL FINISHING



- Eliminates the need and cost of Diamond Wheels
- Extends the cutting life of the tool
- Produces a superior Micro-Finish
- Uses low cost BEHR-MANNING® Abrasive Belts

● This new abrasive belt development by BEHR-MANNING CORP., and the FENLIND ENGINEERING COMPANY is fast taking hold in toolrooms everywhere. Besides the obvious savings that go with the elimination of costly diamond wheels, the extra cutting life of the tool further lowers costs and raises production. It will pay you to investigate this revolutionary new finishing method. You can do it easily at a nearby BEHR-MANNING Demonstration Room, or write Behr-Manning Corp., Troy, N. Y., Dept. TE-5.

In Canada: Behr-Manning (Canada) Ltd., Brantford.
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The Fenlind Micro-Finisher equipped with BEHR-MANNING Micro-Finishing DURITE Paper Belt. A simple calibrated gauge assures perfect setting of relief angles.



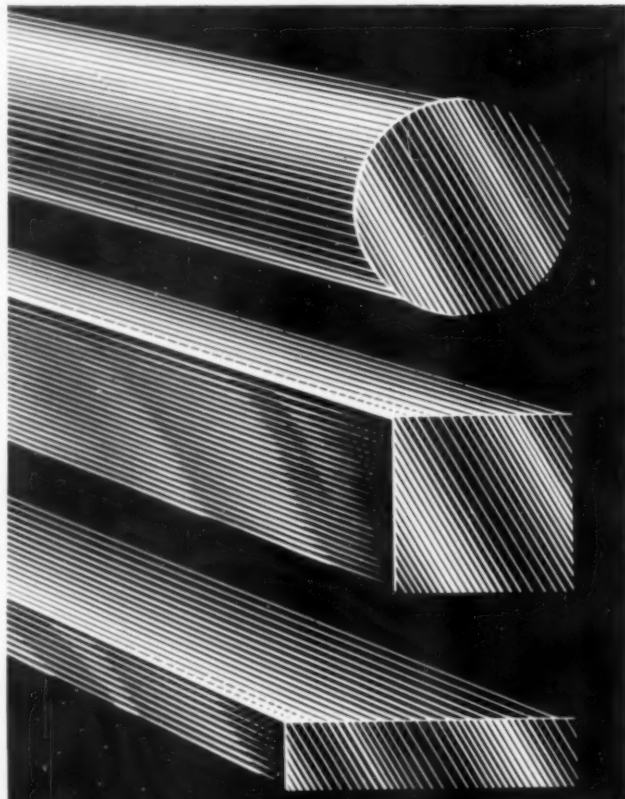
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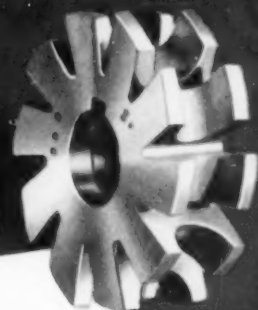
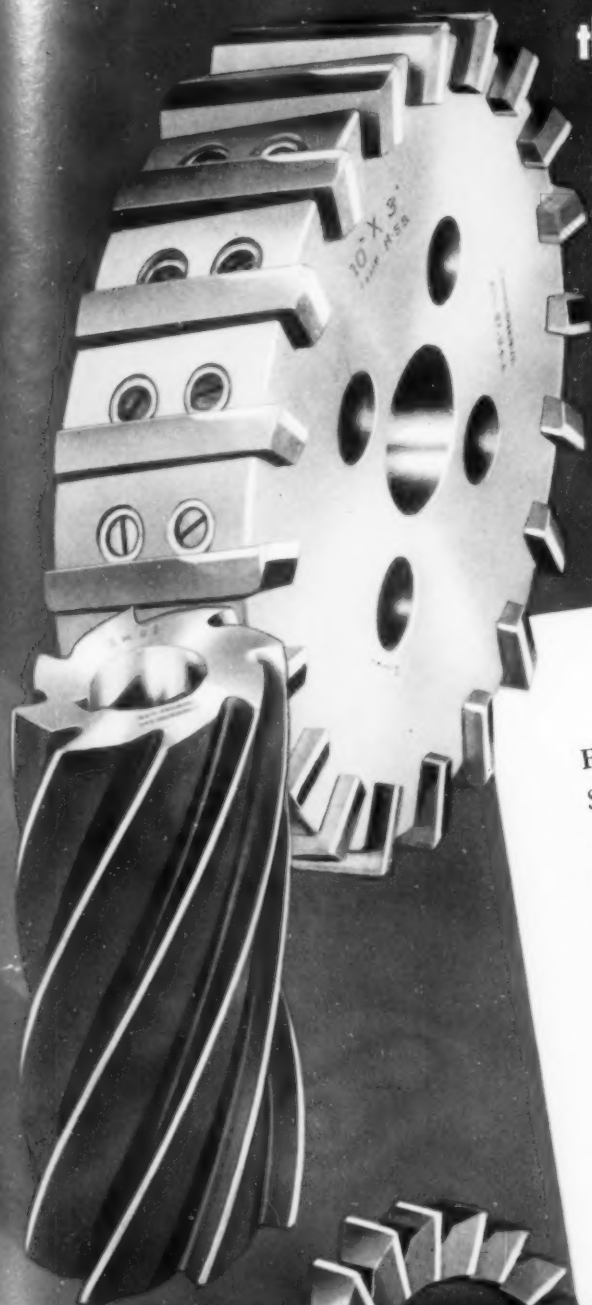
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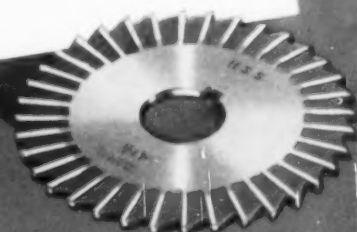
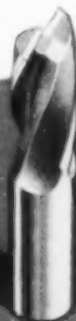
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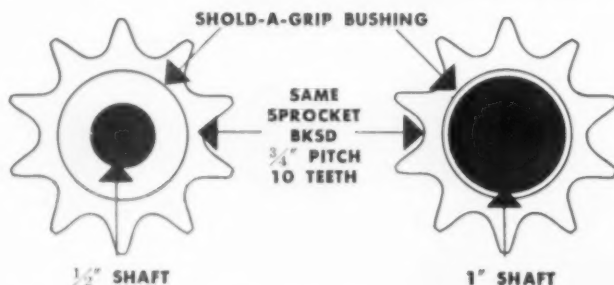
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BROADER SIZE RANGE. FIT SHAFTS $\frac{1}{2}$ " to $2\frac{1}{2}$ " by 16ths

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ONE SPROCKET FITS MANY SHAFT SIZES SIMPLY BY CHANGING THE BUSHING



Example: Sprocket BKSD, $\frac{3}{4}$ " pitch, 10 teeth, can be used on 9 different shaft sizes, any size from $\frac{1}{2}$ " to 1" by 16THS, by inserting the correct size SHOLD-A-GRIP Bushing.

Illustration at top of page is typical design of SHOLD-A-GRIP Bushing and Sprocket with minimum number of teeth.

Illustration at right is typical of design of SHOLD-A-GRIP Bushing and Sprocket with maximum number of teeth.



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 FOR SLIP-PROOF GRIP

Boston Gear expert engineering has provided a correct taper in SHOLD-A-GRIP Bushings and Sprockets for slip-proof grip. When screws are tightened the bushing grips both sprocket and shaft with maximum holding power, even on shafts which vary from true diameter.

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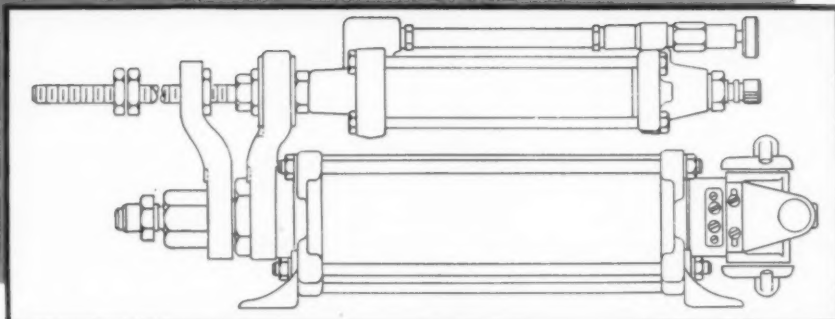
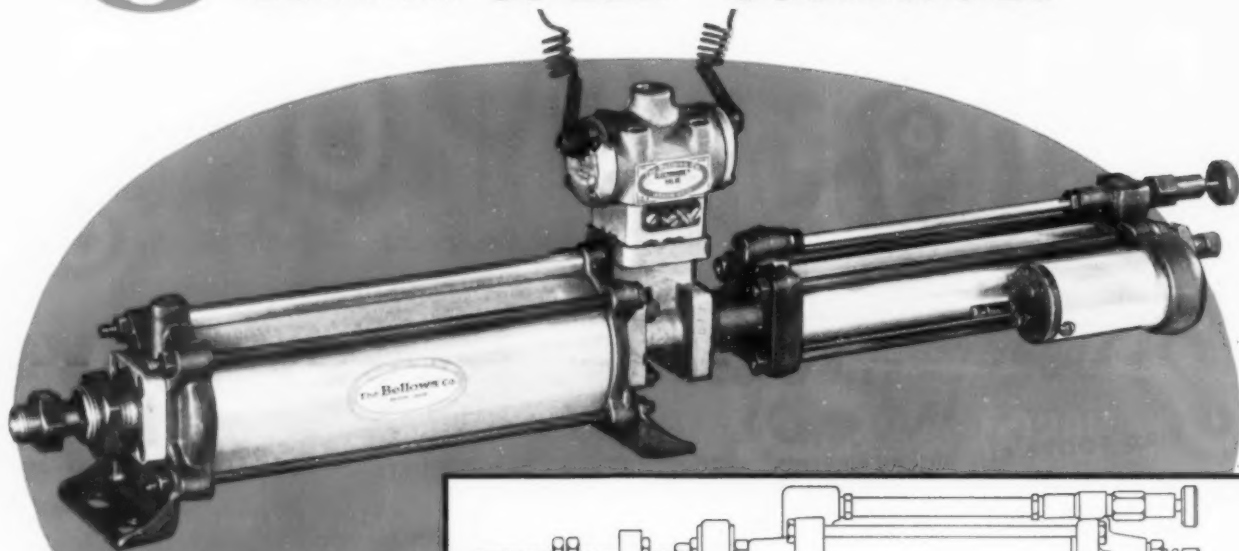
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The Bellows Air Motor and Hydro-Check (Model HCB-EM) is available arranged in tandem as shown above, or in parallel, as sketched.

Combination units of Air Motor and Hydro-Check are also made with any one of six other Bellows directional valve arrangements; and, of course, Air Motors and Hydro-Checks are available as separate units.

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This combination of Bellows Air Motor and Hydro-Check is available in five bore sizes: 1¼", 1½", 2½", 3⅝" and 4½" in standard stroke lengths up to 18".

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**YOU
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TWO!**

These two high speed bits do nearly all general machining jobs!

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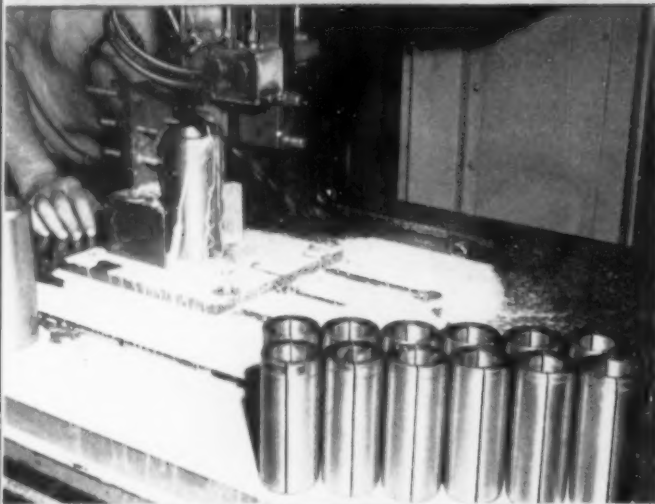
May, 1953

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A-5-247

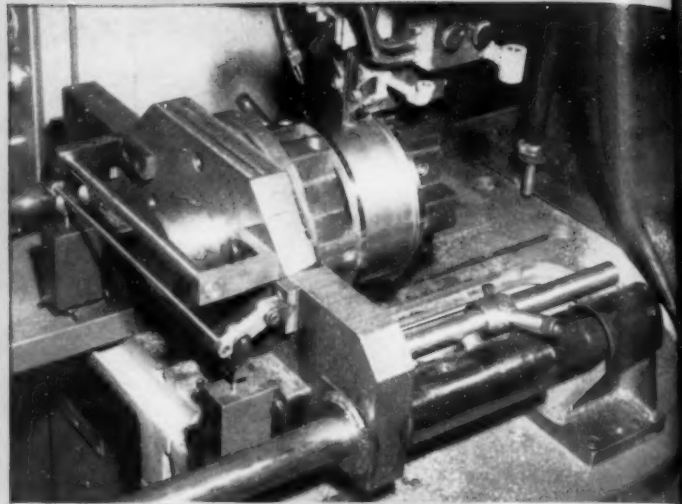
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PRODUCTION

Low Cost Answer to Many Operations



SLOTING Slotting bushings, using fixture and special heavy gage DoALL Saw Band to produce desired slot width.



SLITTING Cutting heavy duty bearings in half. Adjustable fixture handles parts up to 11" dia. x 14" length.

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Blade tension indicator
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Table feed pressure control
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DoALL
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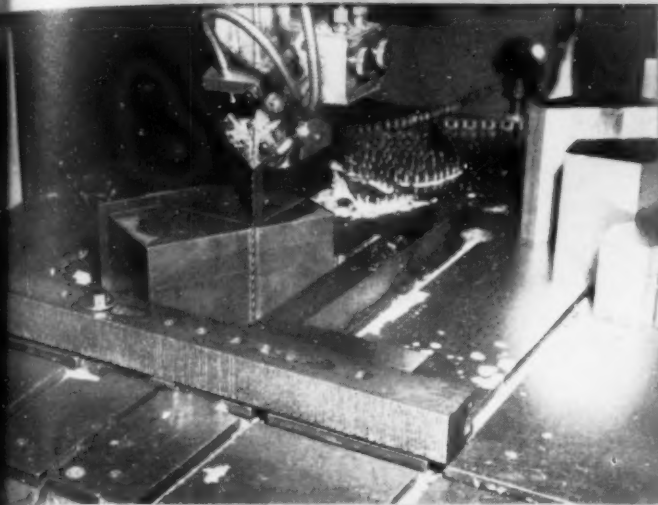
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Runs of Identical Parts



ANGLE CUTTING Back-up bar is bolted to saw table. An angle is bolted to back-up bar. Fully adjustable.



STOCK REMOVAL Excess stock required to hold pinions in gear cutter being removed automatically.

Use of Simple Fixtures Often Lets Bandsawing Replace More Costly Machining Methods

HOW the use of simple fixtures bolted to DoALL power feed bandsaw tables extends the usefulness of the machines in mass production work can be seen from the accompanying illustrations. Many jobs that would otherwise be performed on slower, more expensive machine tools are now being done on DoALL machines because of the user's ingenuity in devising fixtures.

The versatility of the DoALL Contour-matic makes it the preferred machine for production sawing. Variable hydraulic table feed, automatic

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To take advantage of the production economies possible with band machining, call your local DoALL Store, or write:

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38 Sales-Service Stores to Serve You—See Your Phone Directory



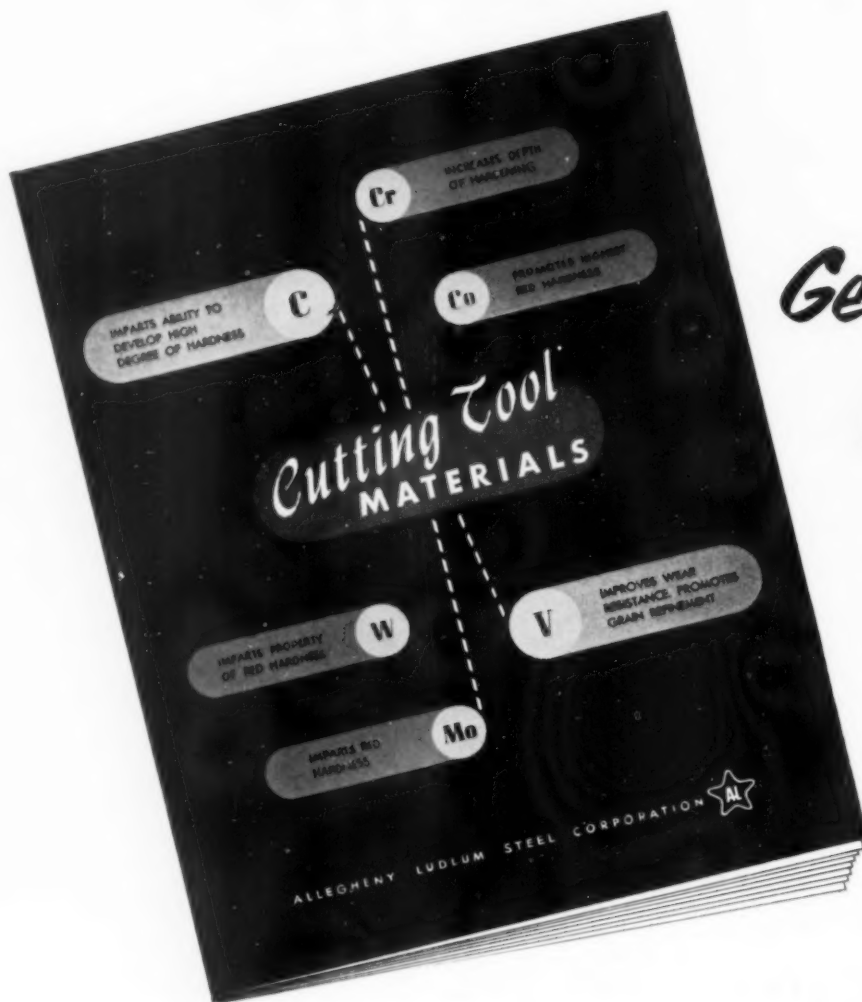
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Complete Service
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By "complete" is meant that Allegheny Ludlum produces the full range of modern cutting tool materials, hence is in position to know and recommend the type best suited for any stated purpose. Unbiased content makes the 8½" x 11" booklet, shown, all the more valuable. Specify its title, "Cutting Tool Materials."

ADDRESS DEPT. TE-41

You should have a personal copy of this 36-page booklet close at hand, if you are continually running into new cutting problems. Use it as a guide to quick answers to scores of possible questions such as:

"Should we use *Carbide* on this job? What grade?" . . . or, "How about tooling up with *Cast Alloy* for that other run?" . . . or, "Can we cut this extra-tough stock fast enough with our usual grade of *High Speed Steel*?"

This booklet in no way replaces, but does supplement, what you can learn by practical experience or what you can gain by calling in an A-L tool engineer. In compact form and quite impartially, the booklet presents the basic facts that enable you to speedily compare the suitability of various tool materials for specific uses. *Send today for your free copy.* There is no obligation involved.

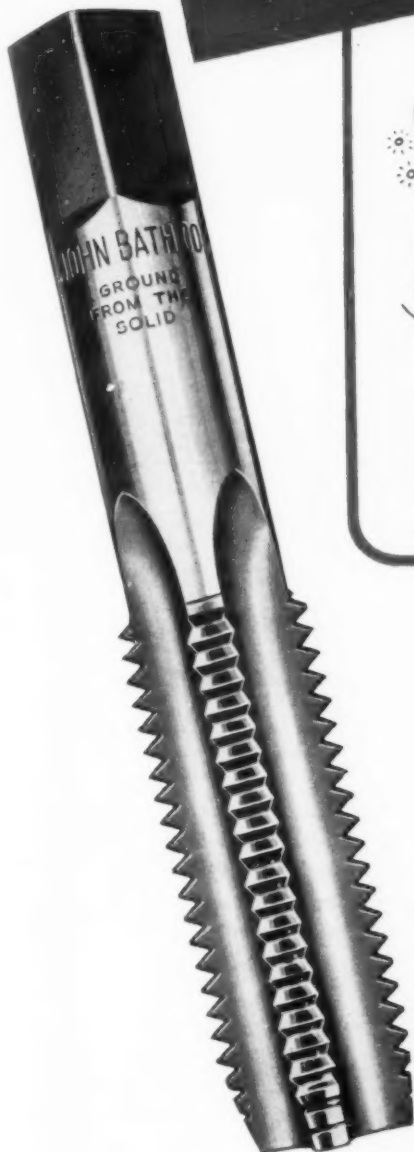
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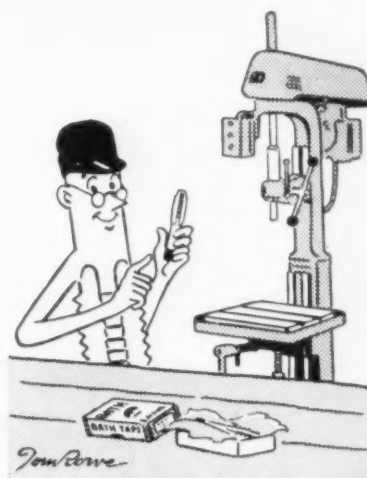
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TAP-ODDITIES



On a windy day, Production Pete
Is always making "checks" —
On the contour of a pair of shanks
Without the aid of "specs".



And when it comes to a production run
Where "specs" must play no pranks,
Pete picks Bath Taps for contour —
Admires their perfect shanks.

The manufacture of Bath "ground from the solid" Taps, has been perfected to take advantage of the latest technical methods, equipment and quality control — producing working tools of uniform structure and in perfect concentricity for precision threading. This means everything must be in line — even to the shank.

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For "true" value — "in line" with long wear — insist on BATH TAPS for BETTER THREADS.

INSIST ON BATH TAPS
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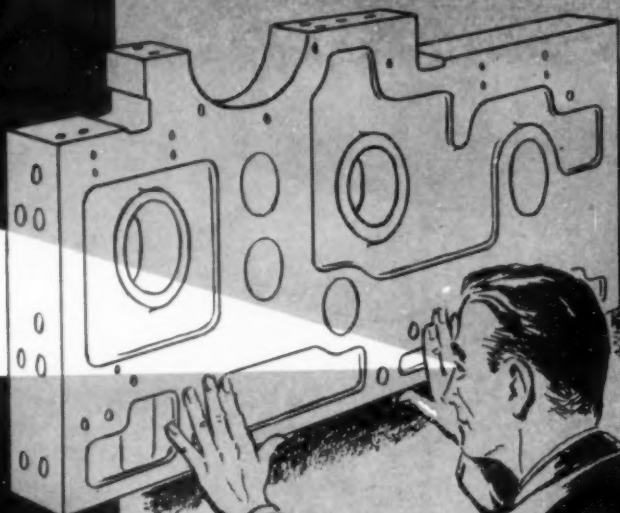


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Our 65th Anniversary



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In The Reamer Field*

Staples

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SHELL TYPE EXPANSION REAMER**

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[®]Patented.

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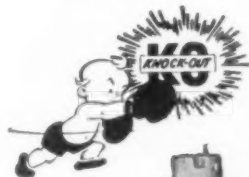
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A complete line of Circular Carbide-Tipped Cutting Tools
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REAMER**

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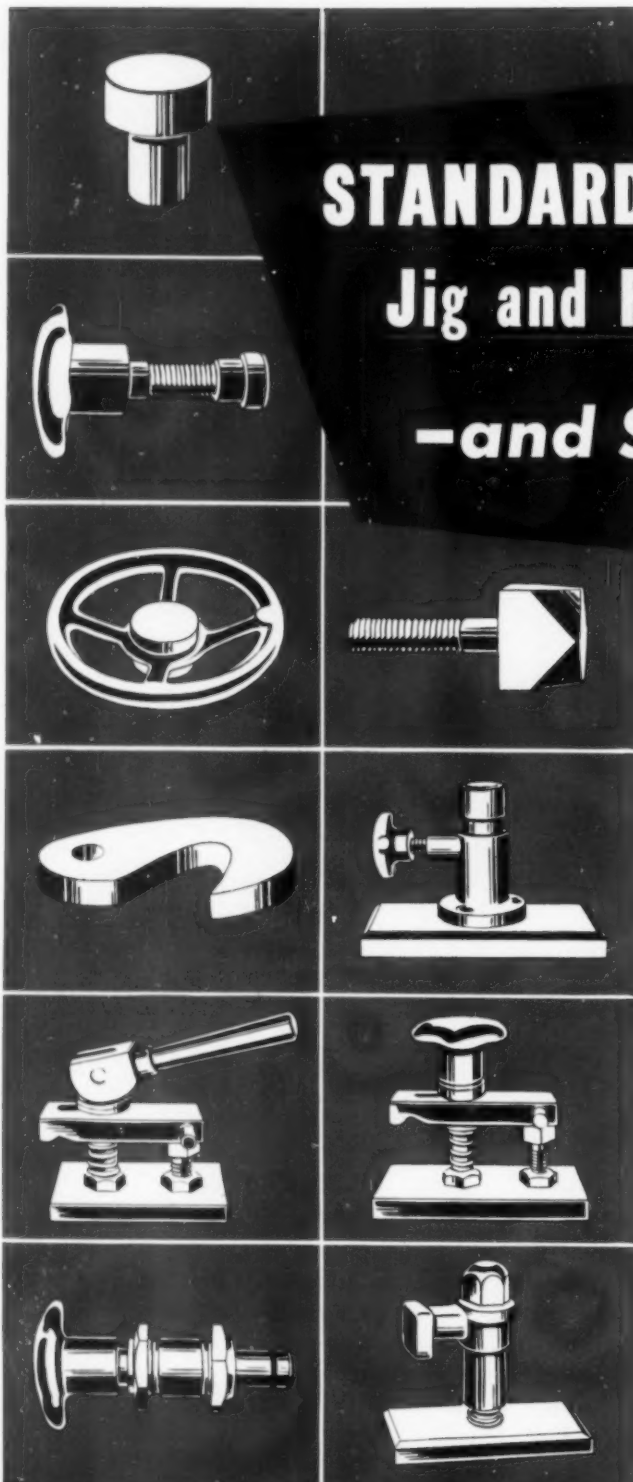
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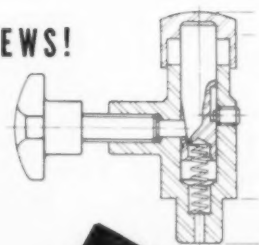
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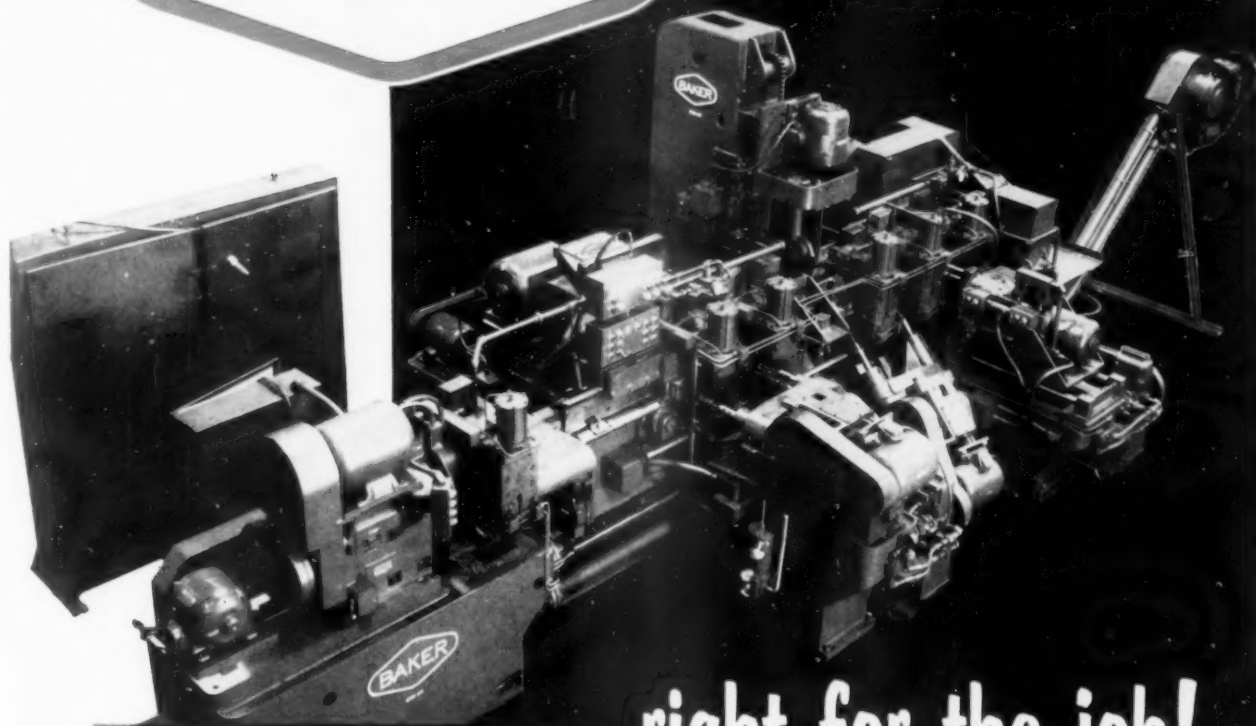
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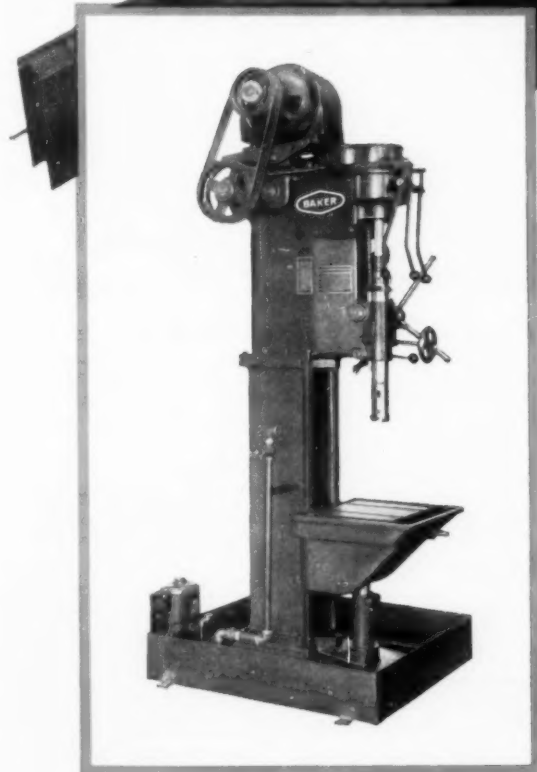
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Regardless of the job requirement, Baker engineers have the know-how to provide drilling machines that will do the job better! Where production figures are of primary importance, Baker will greatly increase productivity . . . and for standard drills over inch and a half capacity . . . there's a Baker *right for every job*. Consult Baker for better drilling machines, no obligation . . . and there is a qualified Baker Sales and Service Representative nearby who is eager to give you prompt and efficient service.

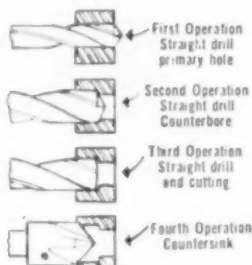
BAKER BROTHERS, INC. Toledo, Ohio
DRILLING...TAPPING...KEYSEATING and CONTOUR GRINDING MACHINES

**WHY use 4 operations
when you can do it in ONE**

SPIRAL METHOD
of machining a
multi-diameter hole
1 OPERATION



TIME CONSUMING
usual method of machining
a multi-diameter hole
4 OPERATIONS



Piece part has rough holes and sharp burrs

with
Spiral STEP TOOLS



(Center Below) Example
of 2" dia. drill,
step ground.

If you're machining multi-diameter holes, you can save valuable minutes with SPIRAL Step Drills. These precision Step Drills, made from ordinary standard twist drills, eliminate costly single operations and at the same time assure you concentricity, reamer-like finishes and tolerances. SPIRAL Step Tool Co., with specially built machines, can produce step drills with either right or left hand spiral, fast or slow spiral, and with two or more flutes.

SPECIAL COST-CUTTING TOOLS

This exclusive SPIRAL counter-bore, ground with true radial relief, will give you maximum tolerance control and longer tool life. It can be sharpened in the face of the flute many times to continue to hold length, finish and diameters within the tolerance of the piece part.



FREE TOOL ENGINEERING HELP...

For a quick answer to your specific-cutting tool problems, send complete details, including tool, part print and specifications. Write for a free copy of latest bulletin showing other examples of SPIRAL time-saving tools.

Spiral

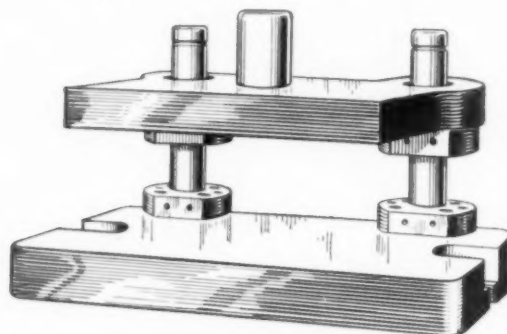
STEP TOOL CO.

Phone:
Longbeach 1-9631

5400 N. DAMEN AVENUE • CHICAGO 25, ILLINOIS

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GET THERE FASTER!**



— SEE YOUR PHONE BOOK
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for only **\$550**
(less accessories, F.O.B. Bridgeport)

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WILSON**

"Rockwell"*



The Best... Costs Less... to Use

Eliminate costly customer complaints. Test hardness at various manufacturing stages with a WILSON "Rockwell" Hardness Tester. Benefit by the long experience of WILSON'S Standardizing Laboratory. A genuine "Rockwell" tester pays for itself.

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There are two types of WILSON "Rockwell" Hardness Testers... Regular and Superficial. They come in many styles with accessories for testing flats, rods, rounds, and odd shapes. For micro-indentation hardness testing, there is the WILSON TUKON.

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ACCO

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WILSON MECHANICAL INSTRUMENT DIVISION
AMERICAN CHAIN & CABLE

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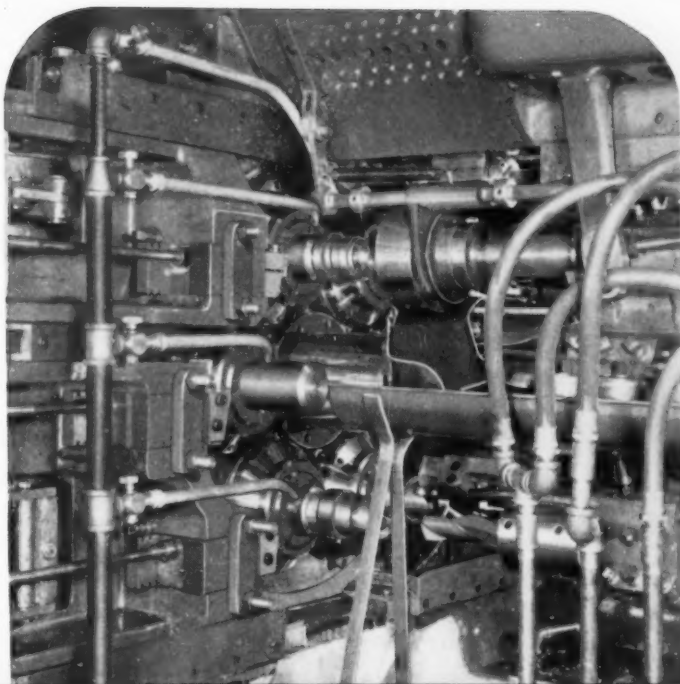
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The Tool Engineer



The main end slide of a 3 1/2-SIX figures prominently in producing the above piece. Its total length is 34 1/2 ins. Its diameter is 12 ins. Its swing for die heads, etc., is 4 ins. The maximum recommended load for the slide is 12,000 foot pounds. Its bearing area is approx. 258 sq. ins.

Front Side of Tooling Area

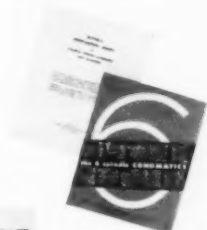
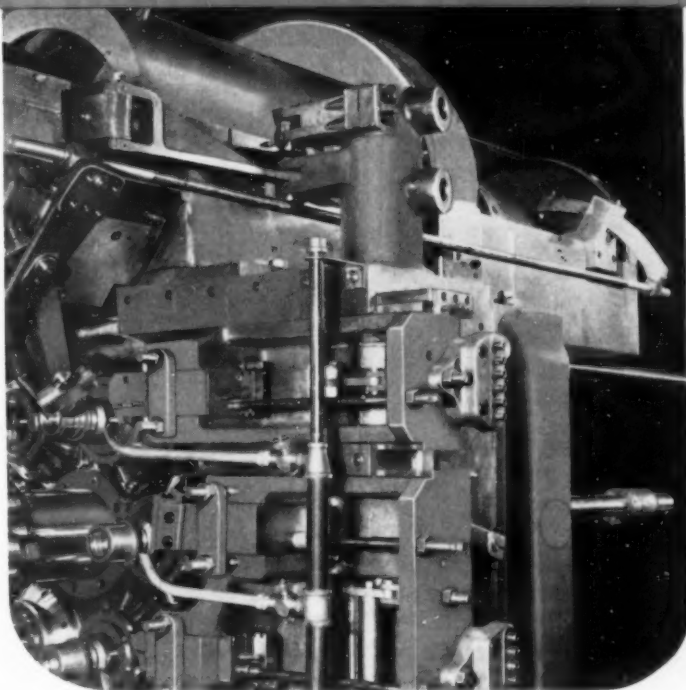


BETTER BEFORE THAN AFTER

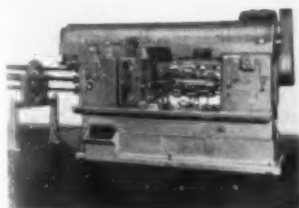
Rear Side of Tooling Area

What an "automatic" does *after* it goes into production is information for which you have already paid a purchase price. How much more you will pay for operation and maintenance costs will determine the completeness and dependability of that information.

It is always better to have complete and dependable information *before* the purchase than after. You can have it on CONOMATICS.



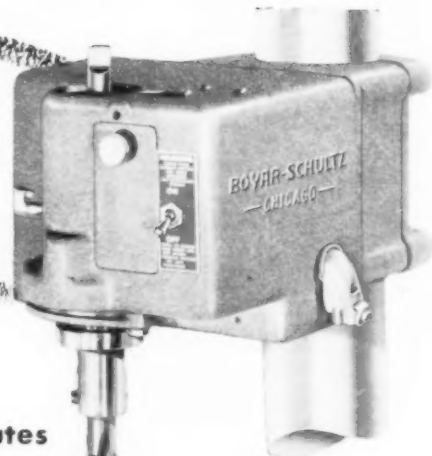
A Comparison of ALL Automatics is in favor of Cone



Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

the NEW BOYAR-SCHULTZ LEAD SCREW TAPPING ATTACHMENT



Change Your Ordinary Drill Press To a Precision Tapping Instrument in Minutes

Quickly and easily fitted to your drill press, it makes an efficient Tapping Attachment that can produce any thread including Class 4.

No special skill required for operation. Anyone familiar with a drill press can consistently produce accurate threads.

Foot control switch leaves hands free for loading work. Built-in reversing switch actuates drill press motor, eliminating need for any intermediate reversing device.

Long, trouble-free life of bronze nut and ground thread Lead Screw is assured, because of their generous $1\frac{3}{4}$ " diameters.

Extreme accuracy in control of tapped hole depth is assured by electrically controlled reversing switches.

All taps up to $\frac{7}{8}$ " diameter usable with standard adapter bushings. Adapters for taps from $\frac{1}{8}$ " to 2" available on special order.

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2106 Walnut Street

Chicago 12, Illinois

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BALL BEARING
CONSTRUCTION**

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ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING, ROUGH AND FINISHED BORING

The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

GATCO ROTARY BUSHING CO.

42330 ANN ARBOR ROAD, U.S. 12, PLYMOUTH, MICH.

Telephone PLYMOUTH 1472

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DIMCO

**HEAVY DUTY
RADIAL DRILLING
MACHINES**

★
**IMMEDIATE
DELIVERY!**

★
**NO PRIORITIES
REQUIRED!**

★

No. TR-1N 4 ft.
No. TR-2N 5 ft.

Rigidly built and carefully constructed for top performance and production economy, these radial drilling machines feature hardened and ground gears of high tensile alloy steel, accurately balanced and precision cut.

PARTIAL SPECIFICATIONS

	TR-1N	TR-2N
Drilling cap. in cast iron	2 $\frac{3}{8}$ "	2 $\frac{3}{8}$ "
Drilling cap. in steel	2"	2"
Max. drilling radius	45 $\frac{1}{2}$ "	65 $\frac{1}{2}$ "
Vert. travel of spindle	13 $\frac{3}{4}$ "	13 $\frac{3}{4}$ "
Spindle speeds (16)	40-1500 rpm	40-1500 rpm

• Write us for complete information!

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CORPORATION**



IMPORTERS OF MACHINE TOOLS
RADIAL DRILLS • MILLERS
TURRET LATHES • GRINDERS
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Waldes Truarc Internal Grooving Tool

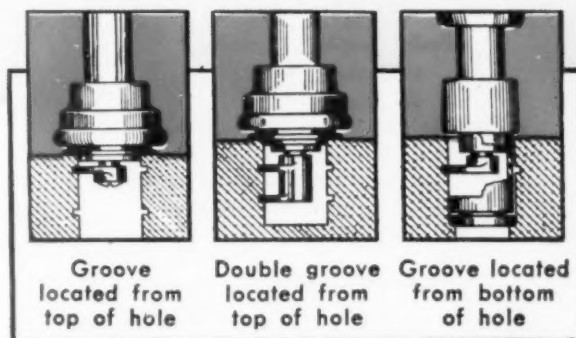
for precision cutting of internal grooves
in bores and housings

FAST! ECONOMICAL! NEEDS NO SKILLED LABOR!



Internal groove-cutting becomes the simplest of operations with Waldes Truarc Internal Grooving Tool. Easy to adjust—easy to operate...readily adaptable to individual requirements.

Designed for use in any hand drill or automatic drill press and screw machine... assures a concentric recess without injury to metal. Operates by fingertip pressure—especially suitable for unskilled operators.



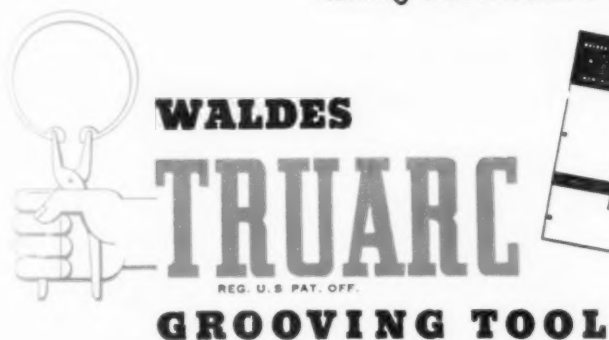
Groove located from top of hole

Double groove located from top of hole

Groove located from bottom of hole

The Waldes Truarc Grooving Tool when used in an electric or pneumatic hand drill, can be taken to the job eliminating disassembly and excessive handling...resulting in all-around savings in time and costs!

Write now for new 12-page Catalog giving mechanical details, cutting sizes...extra features...full information



WALDES KOHINOOR, INC., 47-16 Austel Place, Long Island City 1, N.Y.
Waldes Truarc Grooving Tool
Manufactured under U. S. Pat. 2,411,426



Waldes Kohinoor, Inc., 47-16 Austel Place
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Please send me your new 12-page Catalog
on Waldes Truarc Internal Grooving Tool.

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JIG GRINDING ACCURACY *guaranteed*



**INFINITE CONTROLLED SPEEDS
30,000 TO 65,000 R. P. M.**

*Easily connect jig grinder
to jig borer or mill*

Then you can finish grind in hardened steel to "tenths" . . . jig grind dowel holes square with a ground base . . . move location of holes in hardened steel blocks . . . jig grind interchangeable holes in hardened sections . . . grind small holes with diamond impregnated mandrels . . . grind contours and relief with tungsten carbide burrs . . . grind radii in die sections . . . eliminate jig bushings in tools where close spacing is essential.

Other infinitely controlled air driven spindle applications

Place spindle on most any machine. Use it for finishing contours on hardened steel working surfaces . . . burring or milling die castings . . . routing wood contours . . . carbide milling or finishing slots . . . finishing holes in hardened steel to "tenths" . . . grinding with diamond wheels, carbide burrs, or diamond impregnated mandrels.

Advantages—10 micro finishes using carbide mills . . . 6 micro finishes using mounted points, operates at any angle . . . air driven, air cooled, overheating prevented . . . speed controlled at optimum point . . . 3 3/8" long motor uses little working space . . . By controlling speed at any point you abolish need for many constant speed spindles.

For immediate quotation please state machine tool application. Get this manual of photos showing operations Vulcanaire performs.



"Dependably accurate to 'tenths'"

Vulcanaire
BUILT BY TOOLMAKERS FOR TOOLMAKERS

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Over 85% of the torque wrenches used in industry are

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Read by Sight, Sound or Feel

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*in inch ounces
... inch pounds
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(All sizes from
0-6000 ft. lbs.)*

STURTEVANT
TORQUE
MANUAL

*Every manufacturer,
design and production
man should have this valu-
able data. Sent upon request.*

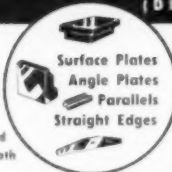
P.A. **Sturtevant Co.**
ADDISON QUALITY ILLINOIS

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A proven necessity...

RAHN Black Granite (DIABASE)

Warp-free
Rust-free
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Extra Hard
Super-smooth



ACCURACY
TO .00005



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FREE TRIAL

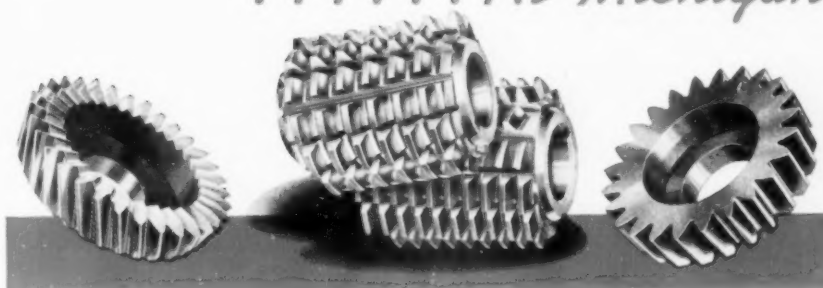
RAHN GRANITE SURFACE PLATE CO.
635 N. Western Av. Dayton 7, Ohio

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Tools of Today Appearing in this
Issue of The Tool Engineer, Use the
Handy Readers Service Card on
Page 139.**

STANDARD TOOLS ARE CUSTOM ENGINEERED

. At Michigan



Most Michigan hobs and shaper cutters are supplied with modifications which our experience has shown are best suited to the particular applications for which the tools are ordered.

Michigan Tool engineers always design hobs and shaper cutters with every step in the production of the gear in mind. They are thus often able to incorporate modifications in the tools that result in lower gear cost, faster and easier finishing, longer gear life, better tooth form, greater quietness—advantages that mean better gears at lower cost.

Specify custom engineered standard gear cutting tools and see the difference for yourself.

GEAR PRODUCTION HEADQUARTERS



MICHIGAN TOOL *Company*



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**COMPLETE
EQUIPMENT for
GEAR PRODUCTION**
*Cutting
Finishing
Checking*

Shown here is only a part of Michigan's complete line

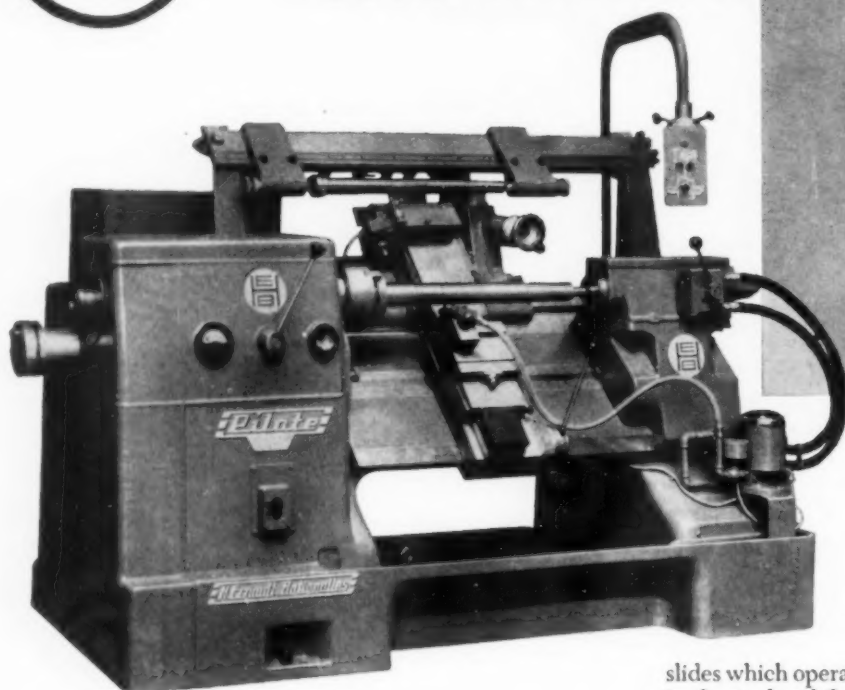
ANNOUNCING...

The Revolutionary New



COMPLETELY AUTOMATIC

HYDRAULIC COPYING LATHE



*See it working at the
TORONTO FAIR.
June 1-12th
Automotive Building
Booths 4247-4249*

Ushering in a new era in metal working, the new H.E.B. PILOTE is the first completely automatic copying lathe. The operator has only to load the machine and *press a button* to start the cycle. When the part is finished the tool returns to its starting position, and the spindle stops automatically!

At the touch of a button the front tool will take one or more roughing cuts over any necessary parts of the component, and finally, a finishing cut. Any narrow undercuts will automatically be cut by one or more rear tools, thus enabling the front tool to be sufficiently rugged to take heavy cuts... The rear tool may also be used for finishing any diameters requiring a micro-finish.

The lathe can be supplied with one or more vertical tool

slides which operate automatically at predetermined points in the cycle while the front tool is also cutting.

The patented H.E.B. hydraulic feed results in improved surface finish, and also simplifies setting up as there are no mechanical parts to adjust. By the design of the system, the feed per spindle revolution will remain exactly as set, regardless of the resistance met by the tool or variations in spindle speed.

The new PILOTE produces work unbelievably fast, accurately, and with a better finish... Yet setup time and tooling costs are slashed dynamically. Motors up to 60 H.P. permit metal to be removed at a terrific rate.

The new H.E.B. PILOTE is the latest achievement of H. Ernault Batignolles — France's century-old machine tool builders and specialists for years in the design and manufacture of *copying lathes*!

If *your* plant is ready for H.E.B. "Push-button Turning" that makes present methods obsolete, then write, wire or telephone now for a demonstration or catalog!

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COPYING LATHES • ENGINE LATHES WITH COPYING ATTACHMENTS • TOOL ROOM LATHES • CARBIDE TOOL GRINDERS

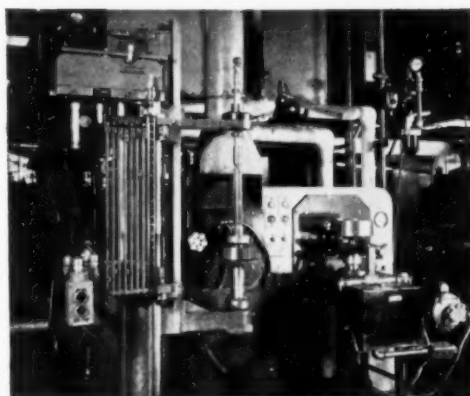
*Take a
second
look!*

**Packard did...and saved
\$1.74 per assembly**

with TOCCO* Induction Brazing

THIS is the "planetary output shaft" for the Packard Ultramatic Transmission. It was originally designed to be made from a forging, but Packard engineers "took a second look" and determined that a slight design change, using a casting and a steel shaft, permitted taking advantage of Induction Brazing. This resulted in a savings of \$74,325 in the equipment and tooling for production, in addition to the actual labor and materials savings of \$1.74 per assembly.

When designing *your* new product, or redesigning present products for more economical manufacture, you will profit by considering TOCCO Induction Heating for brazing, hardening, soldering, forging or shrink-fitting. Designing for Induction Heating pays off!



A 30 KW, 10,000 Cycle TOCCO Unit Brazes 45 Assemblies per hr.

THE OHIO CRANKSHAFT COMPANY



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Dept. Dept. G-5, Cleveland 1, Ohio

Please send copy of "Design and Manufacture for Profit".

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Position _____

Company _____

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City _____ Zone _____ State _____

NOW... GISHOLT VERTICAL BALANCING MACHINES

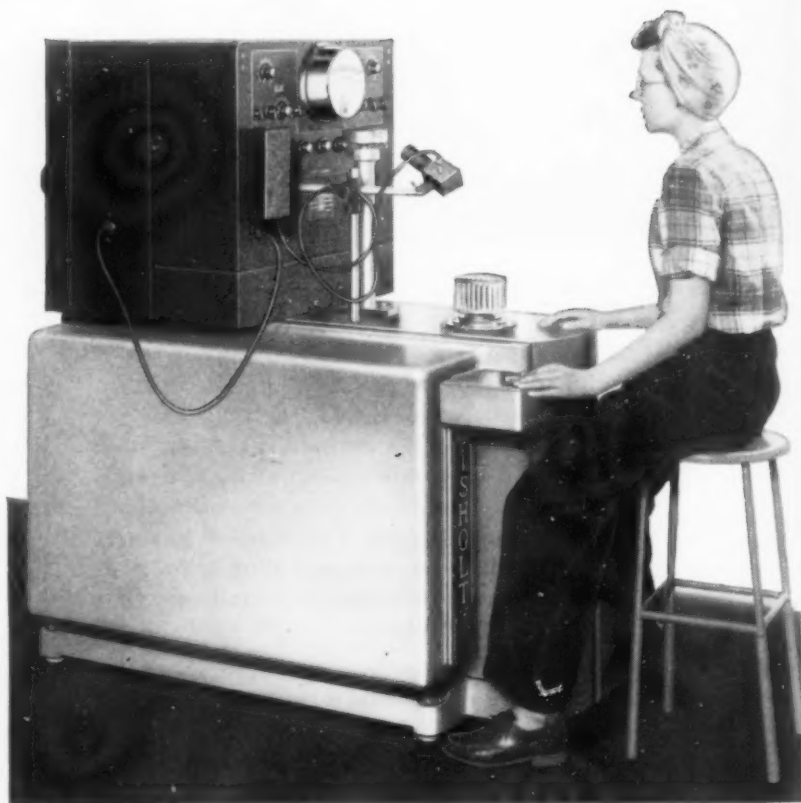
STILL FASTER PRODUCTION BALANCING FOR PARTS UP TO 50 LBS.!

Gisholt leadership in balancing is demonstrated again.

Designed for high volume balancing, these new models locate and measure unbalance with a speed and accuracy unequaled by any other means. Unbalance vibrations as small as .000025" are clearly indicated.

Here's everything for sustained high speed production: compact design . . . meter and angle dial at eye level . . . spindle close to operator for speedy handling of parts . . . all controls efficiently grouped for short reach, less movement, minimum operator fatigue. Machine may be furnished with raised bed for operator to work in standing position.

Using the same proved principle as other Gisholt Balancing Machines, Gisholt Vertical Balancers are available for both static and dynamic balancing of parts up to 50 lbs. Correction equipment can be added where desired. Write for full information.



The Model 1SV1 Vertical Balancing Machine illustrated is one of four basic models of this new type.



*** GISHOLT BALANCING SCHOOL.** Complete courses are now offered, covering the theory and practical applications of balancing to help you with your problems. Ask for details.

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.



GISHOLT MACHINE COMPANY
Madison 10, Wisconsin

MACHINE STAMPING AND EMBOSsing DIES

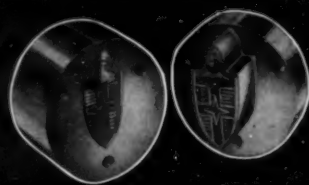
Higher production with CADILLAC Dies is assured by special steel selection, controlled heat treatment and precision engraving — noted for accuracy and high quality. We'll be glad to advise you on best marking methods.



FORGING HAND STAMP



DIE INSERTS



EMBOSSING DIE



PUNCH PRESS DIE



ROLL SEGMENT DIE



SOLID ROLL DIE

HEAVY BEVEL STEEL LETTERS AND FIGURES

The faces of CADILLAC Steel Letters and Figures combine a high degree of hardness with toughness, insuring exceptionally long life. Each stamp is clearly marked with character designation and size. Long tapering bevels assure easy alignment of characters. (To the right, note CADILLAC's sturdily boxed Interchangeable Steel Type Set.)

CADILLAC 115 HAND MARKING MACHINE

For general purposes this floor type machine gives top service. Marking is done in a rolling operation—requiring minimum pressure. Marks flat or round parts of varying thickness. Foot pedal for marking flat or irregular contoured parts; table screw adjustable for round parts.

CADILLAC 52 AIR IMPACT PRESS

For high speed marking, assembling, branding, staking, crimping, riveting, also for producing light stampings. The 52 effects great savings in production—delivers speeds up to 10,000 strokes per hour—pressure up to 8 tons. Safe to operate, automatic controls. Can be hand, foot or electrically actuated.

Machines Above, Write for Bulletin M-120
Misc. Items, Write for Bulletin SE-130.

CADILLAC 45 HYDRAULIC MARKING MACHINE

Here's a compact, self-contained, manifold mounted, hydraulic unit. One control gives full range of marking depth. It will mark round, flat and irregular surfaces. Machine capacity is up to 110 one inch impressions per minute.



HAND STAMP NUMERALS



INTERCHANGEABLE TYPE AND TYPE HOLDER SET



HAND STAMP SYMBOLS



Marking Devices

CADILLAC STAMP COMPANY

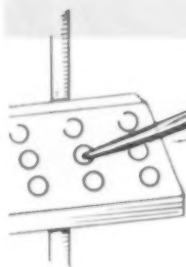
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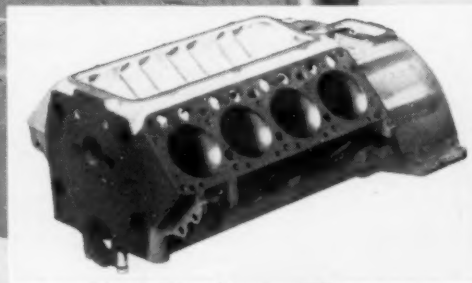
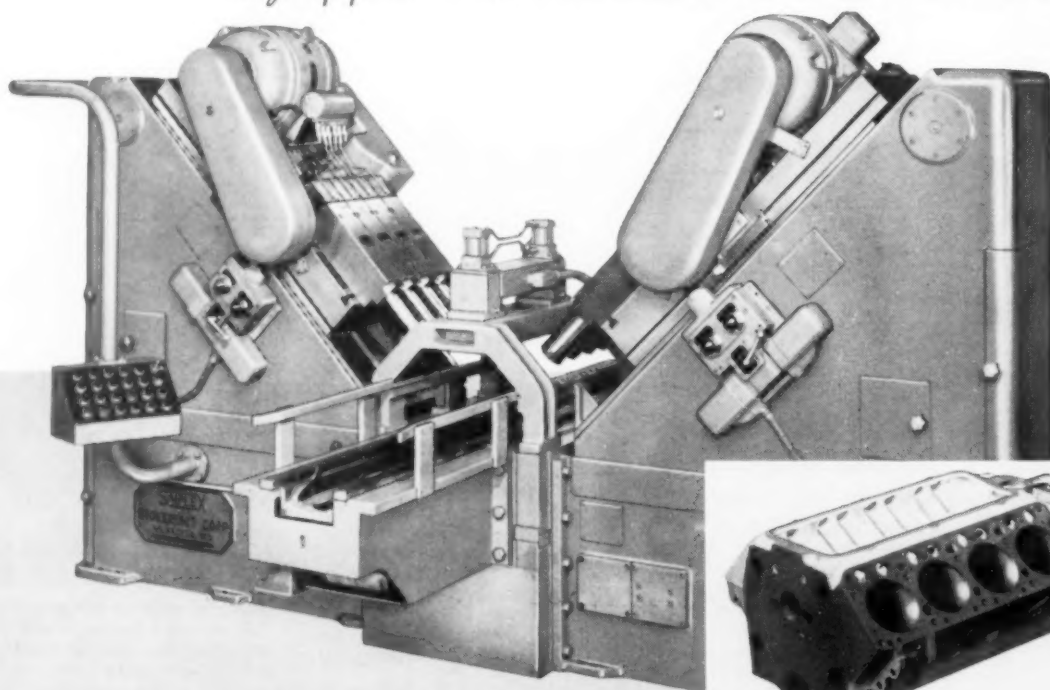
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Feather Touch Handling...



with **Simplex**

PRECISION BORING MACHINES
Equipped with **TRANSFER TYPE FIXTURES**



An outstanding example of **SIMPLEX** Machine Tool adaptability to modern production demands is the "Vee" type boring machine used to finish precision bore eight cylinder motor blocks. Designed primarily for accuracy, the machine also incorporates clean, rigid, and modern design for accessibility. A 3-station transfer type fixture equipped with safety control and hydraulic clamping positions holds the cylinder block, while the unit type boring heads bore the 8-cylinder bores in the piece part.

Simplex

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SIMPLEX MACHINE TOOL CORPORATION

FORMERLY STOKERUNIT CORPORATION
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PRECISION BORING MACHINES

• PLANER TYPE MILLING MACHINES

• SPECIAL MACHINE TOOLS

no tie rods...

no bulky end caps...



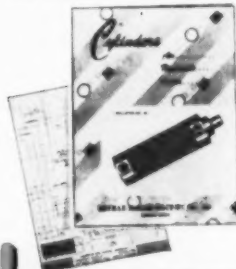
O-M air • hydraulic
CYLINDERS

FIT where others won't!

In close quarters, an O-M Cylinder really shines because it is ALL CYLINDER! The *interlocking mechanism*, which does away with tie rods and projecting end caps, means that *more power is packed into less space*. Saves up to 1/3 installation space. Also provides perfect alignment, friction-free performance. Easier to install and repack. End plugs tapped for universal mounting . . . with a complete range of mounting brackets, interchangeable bore for bore. All machined steel, with bearing bronze (no castings)—easily turned down to fit in deep recesses of machines or bases. Available in full range of sizes (1 1/2" to 8" bores) with standard, 2 to 1 or oversize rods. *Completely interchangeable parts.*

14-DAY DELIVERY ON MOST SIZES

Send today for **FREE** catalog and complete set of 1/2 and 1/4-scale templates showing all cylinders and mounting brackets.



mail coupon now!

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☐ Please send latest O-M Catalog

☐ Please send Complete Set of Templates

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

COST REDUCTION

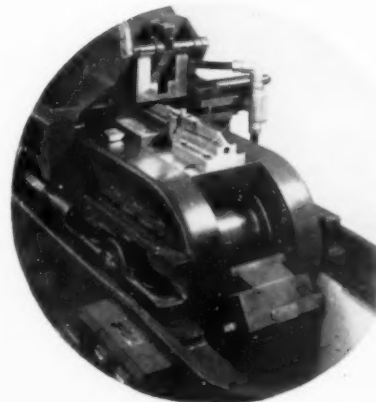
thru
faster
continuous
broaching
of multiple
parts



• Wherever metal is removed on duplicate small parts you are apt to find a place where Footburt Surface Broaching Machines can cut manufacturing costs. Production is high, and tool maintenance is low in cost per piece. We have had many years of experience in designing the tooling for various types of parts and will gladly advise you in applying surface broaching to your work.

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building



• Holding fixtures are designed for quick, convenient loading, with automatic clamping and unclamping.

FOOTBURT

M A C H I N E T O O L S



IF YOU USE TOOL STEEL, THESE ARE FACTS YOU SHOULD KNOW

When you make or use a tool or die you invest a sizable sum of money. And there are steps you normally take to protect your investment. You make sure the design is right. You follow through with accurate tool-making and correct heat treating. But there is *one* factor involved in the success of your die, over which you have only indirect control. That factor is the *soundness* of the die steel you start with. After all, if the steel itself isn't right, you needlessly risk your entire investment.

How can you be *sure* the die steel you use has what it takes to assure good tools? The answer lies in the painstaking controls regularly practiced by the steel manufacturer. Listed here are the four important tool steel controls pioneered by Carpenter to give steel users like yourself the protection you need. Before you place that next tool steel order, ask yourself, "Does our steel supplier guarantee these four quality controls in the die steel we use?" Then remember: You can be *sure* of them when you specify Carpenter Matched Tool and Die Steels. And you don't pay anything extra! THE CARPENTER STEEL COMPANY, 154 W. Bern St., Reading, Pa.

4 Tool and Die Steel Developments Pioneered by Carpenter Help Carpenter Customers Cut Costs, Improve Die Performance

Since 1929:

HOT ACID DISC INSPECTION has been standard practice at Carpenter. To Carpenter customers it provides full assurance that Matched Tool and Die Steels are internally sound, shipment after shipment.

Since 1930:

The TOUGH TIMBRE TEST has assured Carpenter users a wider safe hardening range, greater dependability in performance.

Since 1933:

The TORSION IMPACT TEST has provided Carpenter Matched Tool and Die Steel users with more complete heat treating information that leads to better tools and dies.

Since 1940:

The CONE TEST, used to check and control hardenability of Carpenter water-hardening Matched Tool and Die Steels, has made sure that sections of the same size have uniform hardness penetration in lot after lot.

Carpenter

Matched Tool and Die Steels



Export Department: The Carpenter Steel Co., Port Washington, N.Y.—"CARSTEELCO"

Mill-Branch Warehouses and Distributors in Principal Cities Throughout the U.S.A. and Canada

**For Extreme
Accuracy** ➔

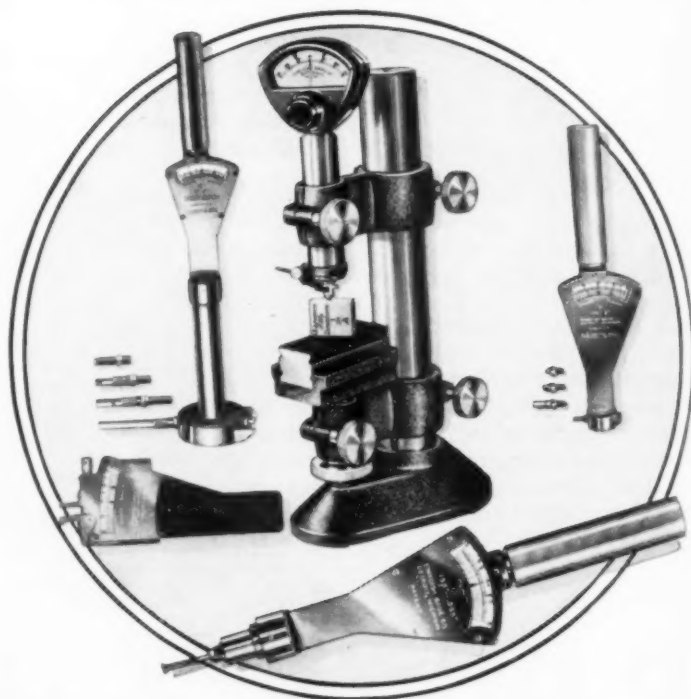
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JOHANSSON GAGING EQUIPMENT



**It Assures You Precision to the
Finest Degree, — to Meet Your
Most Exacting Requirements —
Backed by the Name Supreme
in the World of Measurement.**

- **GAGE BLOCKS**
(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant
- **INTERNAL INDICATORS**
(for inside measurements. 155 to 24 inches)
Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.
- **MIKROKATOR**
(Amplifier — for outside measurements)
Graduations .0001 to .000002 or .001 M to .0002 M
- **OTHER JOHANSSON PRODUCTS**
Micrometers, Snap gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators



Write for Literature

C. E. JOHANSSON GAGE CO.

(A DIVISION OF SWEDISH GAGE CO.)

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NATCO HOLETAPPERS

Lower Maintenance Costs and Increase Production

with **INDIVIDUAL LEAD SCREWS**

Developed and Patented by NATCO for
Outstanding Performance

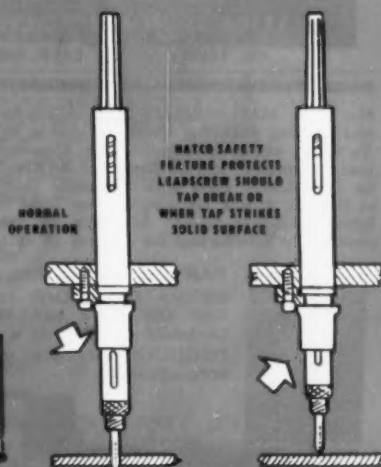
**NATCO
ENGINEERED**
for Quality and
Quantity Production

PROVIDE CORRECT LEADS

PRODUCE ACCURACY

LENGTHEN TAP LIFE

ELIMINATE COSTLY DOWNTIME



THIS IS A VERTICAL NATCO HOLETAPPER tapping twenty holes simultaneously in a gear case. NATCO HOLETAPPERS are provided with reversing motor drives as well as individual lead screws. They are available with any number of spindles for vertical, angular or horizontal operation in a range of sizes and capacities. Write for details.



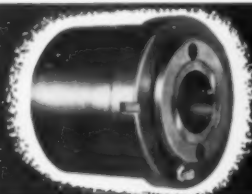
Call a Natco Field Engineer
to help you solve your problems in
Drilling, Boring, Facing and Tapping.

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

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THE ONLY PILOT BEARING BUSHING WITH ABSOLUTE SEAL AGAINST COOLANT AND GRIT!

True—absolutely true—the Jergens Pilot Bushing provides complete sealing against abrasive grits and dust or other damaging materials entering into the roller bearing cavity. Amazing as it seems the entry of grit into the outer seal actually increases the effectiveness of the seal. Furthermore, this revolutionary bushing provides greater bearing accuracy—bushing stability and the first long lasting, complete seal in the roller bearing field.

SEND FOR CATALOG NO. TE-5

PERFORMANCE FEATURES

- * Absolute seal against coolants, grit and dust
- * Bearings can be disassembled without removing housing
- * Cartridge-type bearing holder provides greater accuracy
- * Protects against thrust loads as well as radial
- * Tapered bearings can be adjusted to compensate for wear
- * Adaptable to receive removable slip bushings
- * Adaptable to receive keys or keyways
- * Can be furnished with shafts to use as pressure rolls

J. G. JERGENS CO.

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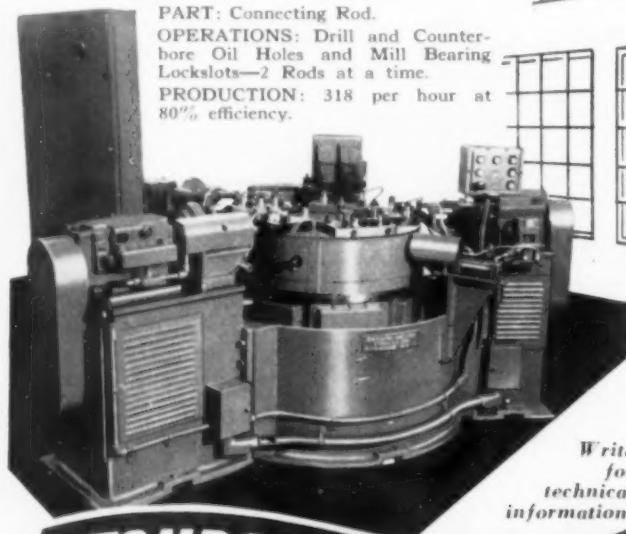
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No. S. O. 4612: 4-Way, 5-Station, Hydraulic Drilling, Counterboring and Milling Machine equipped with a 36" diameter Hydraulic Index Table on which is mounted five 2-position fixtures employing automatic clamping and unclamping. At Stations 2, 3, and 5 are Hydraulic Drill Units, each with 2-Spindle Drill Heads, while at Station 4 is a Hydraulic Way Type Unit with a 2-Spindle Milling Head. All units of the machine are electrically interlocked for control of cycle.

PART: Connecting Rod.

OPERATIONS: Drill and Counter-bore Oil Holes and Mill Bearing Lockslots—2 Rods at a time.

PRODUCTION: 318 per hour at 80% efficiency.



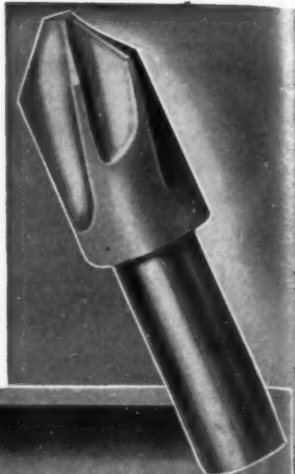
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STANDARD MACHINE AND TOOL CO., LTD.
U.S.A. Sales Representative
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They are terrifically popular because the six staggered cutting edges are scientifically designed to give a shearing cut and thus eliminate all chatter. Made in 12 sizes in all degrees; also supplied as sets in strong Kit-cases.



Send for Catalog Sheet HC1



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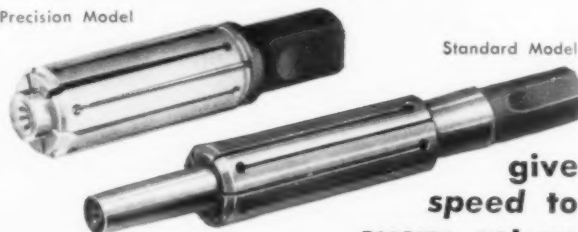
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CHAMPION E-X-P-A-N-D-I-N-G MANDRELS

Precision Model

Standard Model



give speed to every set-up

The flexible sleeve, mounted on tapered arbor, expands automatically to fit the hole. Inserted by hand—no arbor press needed. Always an exact, positive, concentric fit. Locked by a single mallet blow. Unlocked the same way. CHAMPION Expanding Mandrels are used in machine shops around the world. Save time, cut production costs, whether the job calls for machining one piece or a thousand.

Precision Model has expansion range of .010". Available in regular sizes to fit holes from 1/2" to 3" diam. Holds work to tolerances of .0002" run-out. Guaranteed for precision grinding, turning and milling operations.

Standard Model maintains close tolerances, handles material of any length bore, hard or soft metals—from thin tubes and bushings to heavy castings and forgings. A set of fourteen will fit every hole from 1/2" to 9 1/2" diam.

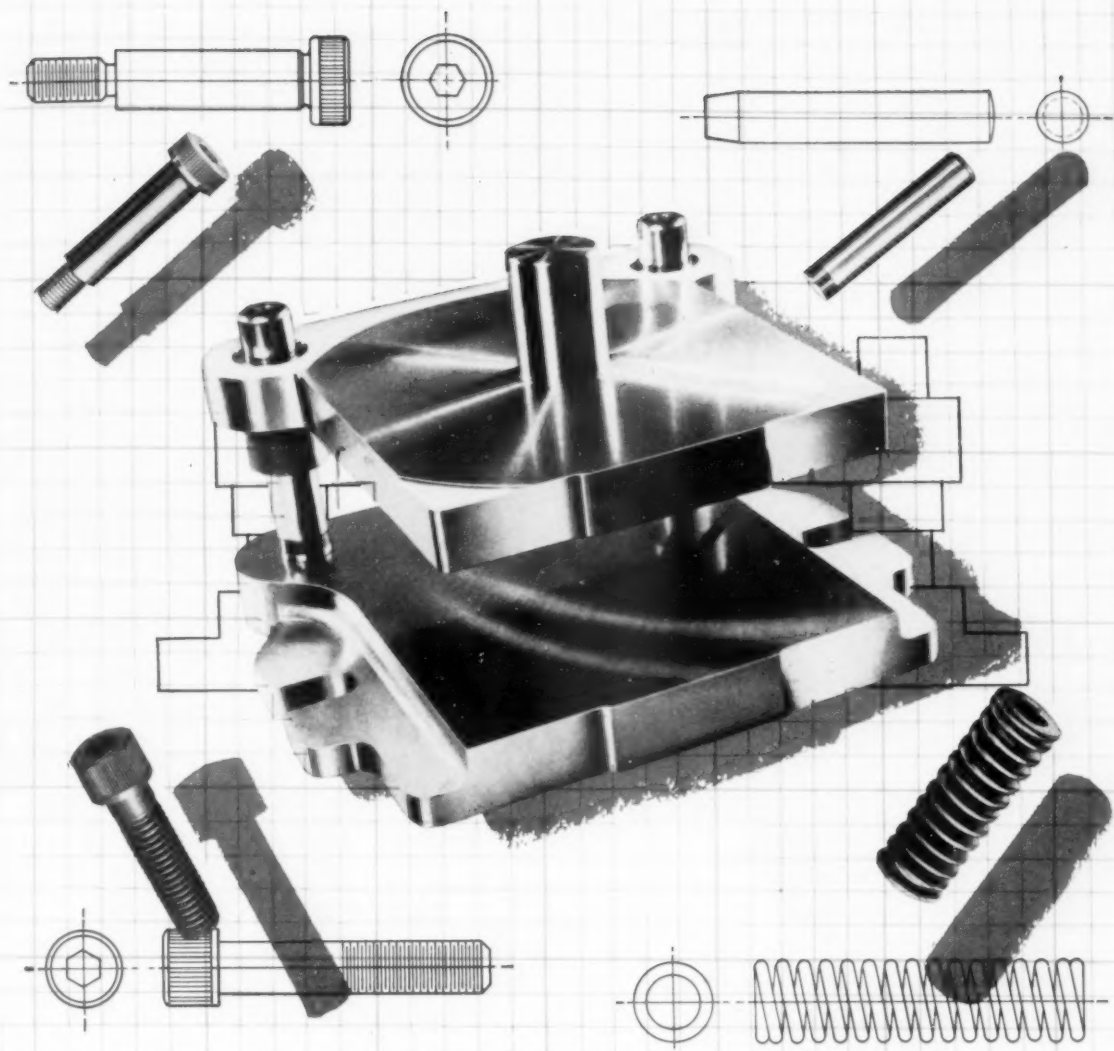
CHAMPION Expanding Mandrels can be made in special shapes and sizes to fit any specifications. Quotations on request. Write for descriptive folder today.

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Dept. 23

Springfield, Ohio

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Plan now for faster tooling *and* longer production runs at less cost... with Danly Die Sets and Danly Diemakers' Supplies.

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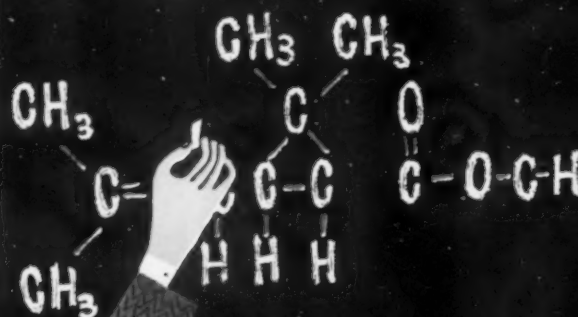
*Indicates complete stock



DANLY MACHINE SPECIALTIES, INC.

2100 South Laramie Avenue
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DIE SETS AND DIEMAKERS' SUPPLIES



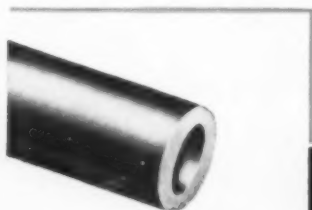
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If you manufacture tool steel parts with cutout centers, and your aim is to reduce production time and costs, you can't afford to overlook Crucible Hollow Tool Steel. It comes in three famous grades: KETOS, AIRDI 150 and SANDERSON.

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For full information and literature, call your nearest Crucible warehouse ... or write for new brochure describing Crucible Hollow Tool Steel. Address Dept. TE, Crucible Steel Company of America, Chrysler Building, New York, N. Y.



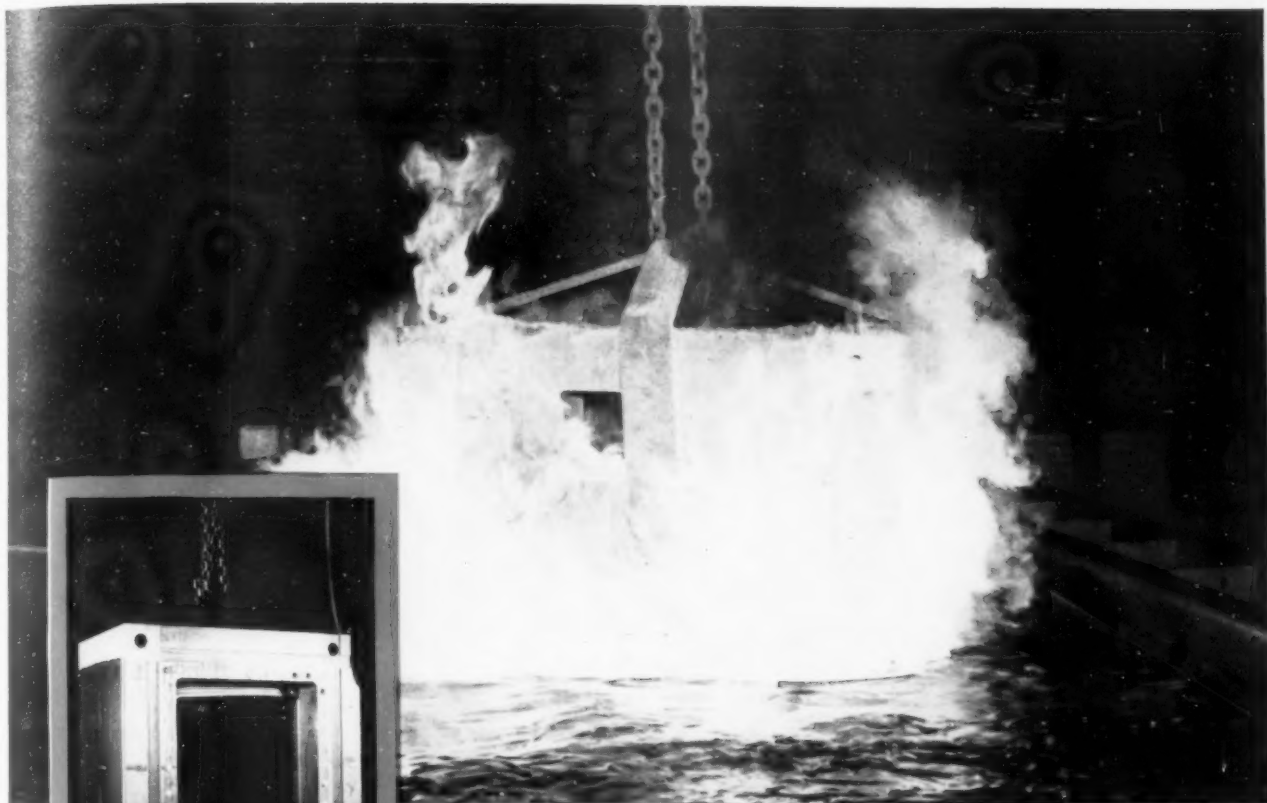
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first name in special purpose steels

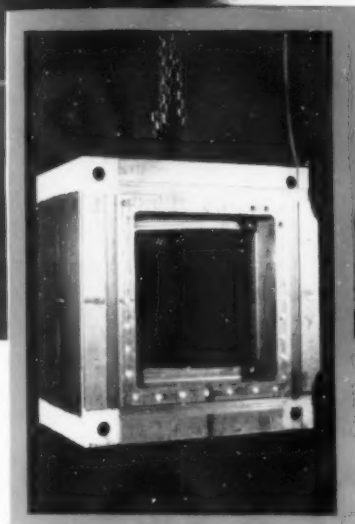
53 years of *Fine* steelmaking

HOLLOW TOOL STEEL

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... oil quenching of cavity mold



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On Chicago's west side, one of the largest sets of plastic molds in the world is producing 21" Motorola television cabinets at a rate of more than one every five minutes.

These molds, designed by Chicago Molded Products Company in cooperation with Motorola, and heat treated by Lindberg Steel Treating Company, weigh more than five tons . . . outside dimensions are 40" x 43" x 36" . . . and they're worth \$75,000 a pair!

The production of such a set of molds is a perfect example of team-work by American industry. Crucible Steel Company poured the ingots, and pressed them into huge blocks each weighing 13,900 pounds. The R. O. Schulz plant in Elmwood Park, Illinois, did the machining and polishing.

Next, came the heat treating . . . the finished molds had to be treated to precisely the right hardness . . . for they had to withstand the washing of plastic materials . . . and they had to be

tough enough to stand up under the terrific pressure of the 1500 ton compression molding press.

At this point Lindberg metallurgists and heat treaters went into action. There could be no trial runs . . . no mistakes, or \$75,000 worth of molds quickly could become \$600 worth of scrap metal.

Heat treating specialists selected the proper furnace, specified the correct heating temperature, the necessary time at heat, the right procedure for quenching. "Operation Motorola" went off without the slightest hitch. Within hours after tempering, the molds received final surface polishing . . . in a matter of days they were forming cabinets for Motorola TV sets.

Lindberg Steel Treating Co., and its large staff of metallurgists and heat treaters are available to consult on *your* heat treating requirements . . . whether your problem is simple or "almost impossible."



A case history of Lindberg Steel Treating Co. service to American industry



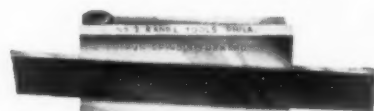
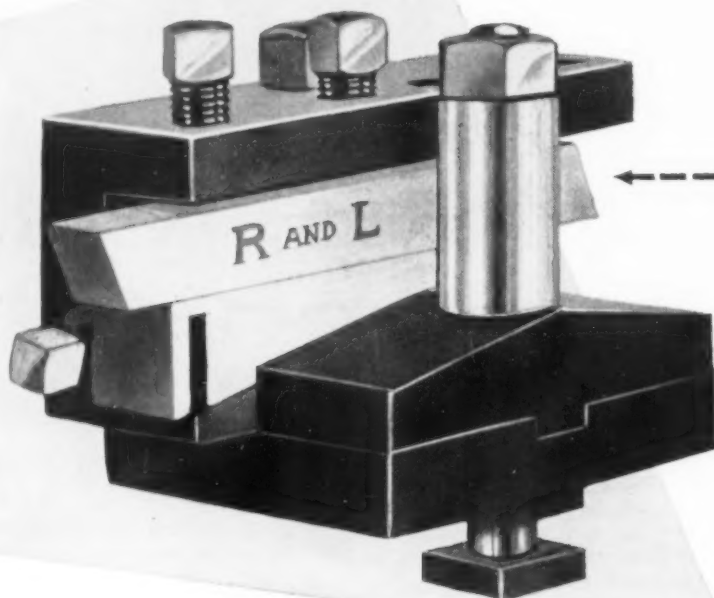
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222 North Laflin Street, Chicago 7, Illinois

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UNIVERSAL
TOOL POST

DOUBLE Duty



specially designed

The R and L Cut Off Blade Holders are precision made to flawlessly fit in the Universal Tool Post.



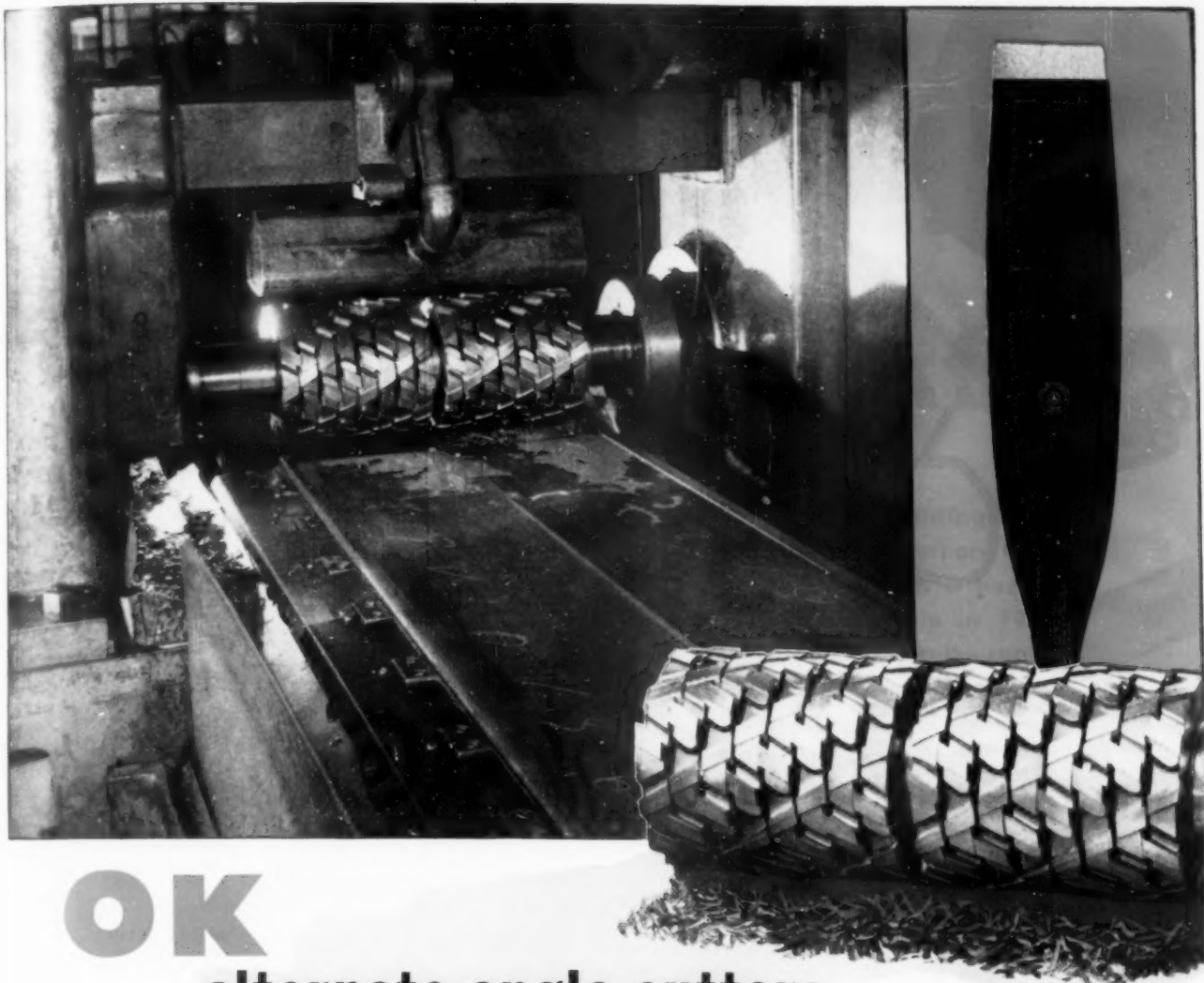
More than just a tool post! The R and L Universal Tool Post is made by men who completely understand your shop problems. Precision manufactured to hold square or flat tools, providing the means for adjusting the tool in all directions. Can be used close to the chuck, on front or back cross-slide with spindle running forward or backward.

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the new
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R and L TOOLS

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TURNING TOOL • TAP AND DIE HOLDER • UNIVERSAL TOOL POST • TURRET BACKREST HOLDER • CUT-OFF BLADE HOLDER • RECESSING TOOL
KNURLING TOOL • CARBIDE AND ROLLER BACKRESTS • RELEASING ACORN DIE HOLDER • REVOLVING STOCK STOP • FLOATING DRILL HOLDER



OK

alternate angle cutters

slab-mill tough chrome-nickel-moly prop blades at Curtiss-Wright

JOB DATA

FEED 8.25 inches per minute

SPEED 30 revolutions per minute

DEPTH OF CUT from 0.055 to 0.10 inches

LENGTH OF CUT 123 inches

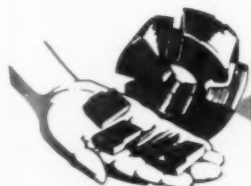
STEEL Chrome-Nickel-Molybdenum alloy

CUTTERS 16 mounted 8 and 8 for straddle milling

Climb-milling the taper on 25x123x.800" chrome-nickel-molybdenum steel plates for the famous hollow-steel propeller blades used on big B-36 International Bombers is regarded as one of the more rugged metal-cutting assignments at the Curtiss-Wright Caldwell plant.

For this second operation, 16 OK alternate angle cutters straddle the center rib of the blade, 8 and 8, are mounted on a 75 hp planer-type miller. The taper extends 123" increasing from 0.055 to 0.10". The cutters are standard OK alternate angle mills with overlapping high speed steel blades. The angular set gives a shearing action, coiling and turning the chips away from the cut. Streamline in design, OK cutters are free from pins, screws, gibs and locks. They pack huskier blades for heavy cuts and more blades per body for finishing cuts. Blades are secured by a driving fit. Mated serrations in body and blades prevent any lateral movement and provide a fine scale adjustment to compensate for wear.

A copy of the OK catalog 13, "Modern Milling Cutters for Modern Milling Machines" is yours on request.



OK

modern milling cutters for modern milling machines

THE OK TOOL COMPANY, Milford, New Hampshire

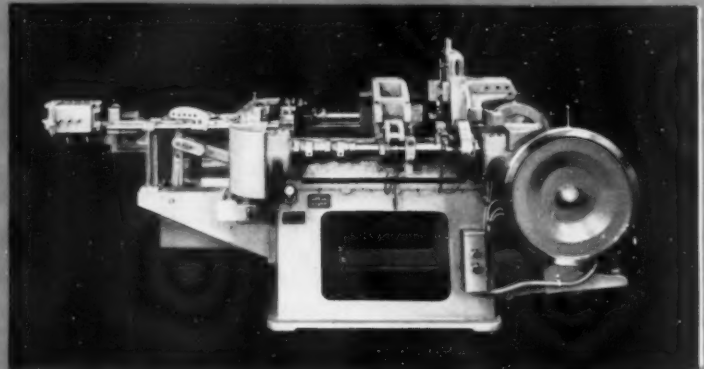


All Produced on U. S. Multi-Slides®!

Secondary operations and handlings mean higher production costs. By producing parts complete in one operation you can—
1. Reduce labor costs. 2. Conserve floor space by eliminating secondary operation machines. 3. Increase production. 4. Simplify inspection. 5. Improve quality.

The parts illustrated are just a few of the many different types of precision formed metal stampings that can be produced complete in the U. S. Multi-Slide. In the production of parts like these from coil stock, the U. S. Multi-Slide can effect substantial savings, because it completes a finished part at each stroke of the machine. Many different types of parts which would ordinarily require costly secondary operations can be profitably produced—uniformly and to close tolerances—and the number of inspections is also reduced.

U. S. Multi-Slides are built in four sizes. Illustrated is the No. 33, suitable for material up to 2½" in width, with feed length adjustable up to 12½". Complete specifications for the four sizes are contained in Bulletin No. 15-M. Ask for a copy.



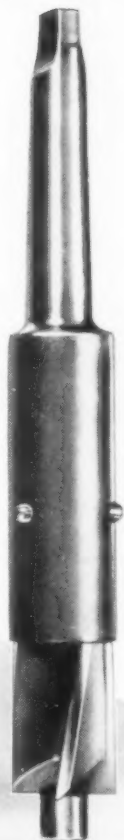
U. S. TOOL COMPANY, Inc.

AMPERE (East Orange) NEW JERSEY

Builders of U. S. Multi-Slides—U. S. Multi-Millers

U. S. Automatic Press Room Equipment—U. S. Die Sets and Accessories

40 YEARS OF LEADERSHIP



1913

Management and employees take pride in announcing to our many friends and customers that Eclipse Counterbore Company became 40 years of age in May. From a humble beginning in 1913 to a position of leadership in 1953, Eclipse is today truly synonymous with quality in the cutting tool industry. This healthy maturity could never have been attained without the help of those same friends and customers . . . and so to them we say "Sincere Thanks."

← The original Eclipse interchangeable single-diameter counterbore created in 1913.

A modern multi-diameter carbide tipped Eclipse Cutter. →



1953



ECLIPSE COUNTERBORE CO.

Founded in 1913

DETROIT 20, MICHIGAN

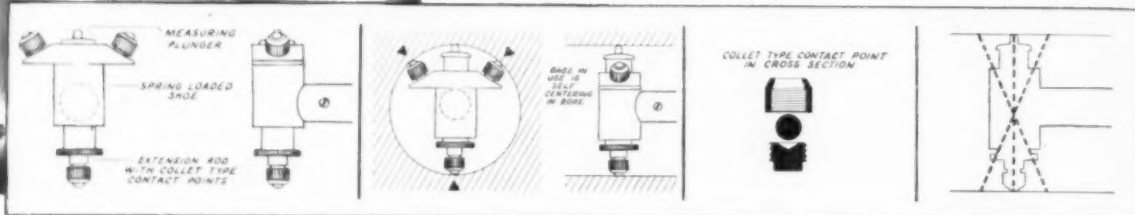


TUMICO DIAL INDICATOR

Small Bore and Cylinder Gages

● Tumico Cylinder Gages are designed to give fast, accurate bore measurement without the use of costly plug gages. Actual bore variation is shown directly on the Dial Indicator. They are efficient and easy to use. Based on the accepted principle in cylinder gaging, they use a fixed point in conjunction with a spring loaded shoe to assure self-alignment in the bore. They give accurate results in half-thousandths of an inch, ten-thousandths of an inch, hundredths, or thousandths of a millimeter, depending on the indicator used.

Collet type contact points are used on extension rods and shoe (Fig. 3). When, after continuous use, flats appear on 3/16" balls, unscrew collet and rotate ball to a new face or replace ball completely. Range of size measures 1/2" to 36" bore and to within 3/16" of bottom of a blind hole. All models supplied complete in instrument cases. Write for catalog.



To use, rock measuring points over axis of bore (Figure 4). This shows minimum or actual indicator reading from true perpendicular position in bore. Variations such as oversize, wear, ovality, taper,

etc., are shown at once. To measure actual size of cylinder bore, set gage to size with cylinder of known diameter or use micrometer measurement over the fixed and moving measuring points.

TUBULAR MICROMETER COMPANY • BOX 80 ST. JAMES, MINNESOTA

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BLANK JAWS
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KEYS
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SCREWS
MALLEABLE
HANDLES
TEE SLOT BOLTS
THUMB SCREWS
TEE SLOT NUTS
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REST BUTTONS
FIXTURE KEYS
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C-WASHERS
STUDS, ETC.

SPECIFY THE LINE THAT SAVES YOU TIME!

Use Jergens mass-produced components as standard in your plant. Realize big savings in design, tool room and production facilities. Jergens makes over 400 precision parts designed to save your time and money—standards that will hold up in the toughest applications usually outlasting the jigs and fixtures on which they are used.



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TOOL SPECIALTY CO.
Dept. TE 712 E. 163rd St.
Cleveland 10, Ohio

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CAN YOU QUALIFY FOR ONE OF THESE 12 ONCE-IN-A-LIFETIME OPPORTUNITIES?

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Our Specific Requirements

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- Three Design Engineers (Senior) — 5 to 7 years experience.
- Six Design Engineers (Juniors) — 3 to 4 years experience.

This is your once-in-a-lifetime opportunity to get in on the *ground floor* of a new permanent program. Completely new \$5 million facility with modern offices and factory. Profit sharing retirement benefits after two years of service. Liberal health insurance. Excellent labor relations. Salary commensurate with ability and reference.

Your new home will be at the gateway to the Midwest recreation playground.

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Give name, age, marital status and summary of experience. We will correspond and interview if application is suitable. All communications held strictly confidential.

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**"STANDARD for
tough jobs since 1881"**



as near as your telephone



Call your Industrial Supply Distributor for
Shield Brand Milling Cutters. Specialized
factory service available everywhere.

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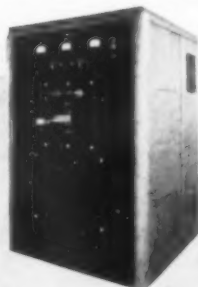
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DEPT. OF DEFENSE work . . . by *LINDBERG* Induction Heating Units



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We can't tell you much about the manufacturing processes at the L. A. Young plant (due to security restrictions) . . . but we can tell you about the many rugged construction features of this equipment . . . features which make it so dependable that the L. A. Young organization selected Lindberg Induction Heating Units for their important Department of Defense work. These points of design and construction will minimize costly breakdowns and aggravating work stoppages:

Filament voltage regulation transformers keep tube filament voltages at proper values regardless of line fluctuations. The end result . . . longer tube life.

Checklites . . . A system of indicating lamps instantly reveals any abnormal operating conditions . . . simplifies servicing.

Work coil burn-out protection . . . An electrical interlock system makes it impossible to turn on power when cooling water is not flowing.

Long-life industrial tubes feature shortened internal structure . . . Kovar metal-to-glass Seals . . . heavy walled anodes.

Sealed tank capacitors are hermetically sealed against dirt and dust . . . require no servicing or refilling.

Investigate Lindberg Induction Heating Units. Ask for Bulletin 1440.

LINDBERG



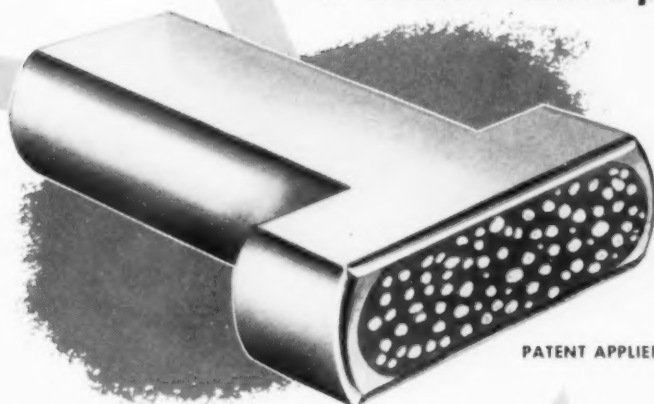
HIGH FREQUENCY DIVISION

LINDBERG ENGINEERING COMPANY,
2442 West Hubbard Street, Chicago 12, Illinois



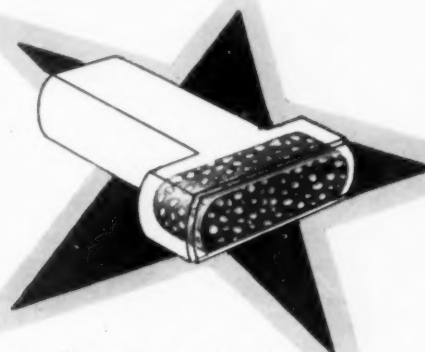
**WE'LL BET YOU--
the Cost of this
Diamond Tool...**

**..try this new
STA-SHARP Diamond
Tool on your
Centerless Grinders--
either it works faster
and saves up to 50%
on diamond costs--or
it doesn't cost a penny!**



PATENT APPLIED FOR

We mean just that: order a STA-SHARP on memorandum. Try it on one of your Centerless Grinders. See for yourself how the STA-SHARP tool requires no turning, no supervision, no inspection—which means saving valuable operator and machine time. See how, with the exclusive STA-SHARP design, as the top layer of diamonds wears down, the next overlapping layer comes into cutting position. (That's why STA-SHARP Tools are not re-set. They stay sharp to the very end). Above all, see how the STA-SHARP Tool dresses wheels faster, makes possible better finishes that produce more pieces between dressings—and saves up to 50% over regular diamond costs. If you are not fully convinced of all this—just return the used tool—and the test will not cost your firm anything!



70 diamonds to the square inch

Phantom view shows overlapping layers of selected small SOLID diamonds which are firmly locked in place in a special matrix by exclusive bonding process. STA-SHARP tools are NOT cluster diamond tools. The cutting face of each STA-SHARP presents not less than 70 solid diamonds per square inch.

**If you accept this challenge —
fill out this coupon...**

To prove exactly what STA-SHARP tools can do in your plant—just fill out the coupon. This is not an order. You will receive the STA-SHARP Diamond Tool on memorandum—with the understanding that after testing it thoroughly your firm can either return the tool without charge—or pay for it.

Golconda Corporation

A Division of Super-Cut, Inc.

3418 N. KNOX AVENUE • CHICAGO 41, ILLINOIS

Golconda Corporation — Dept. TE-5, 3418 N. Knox Ave., Chicago 41, Illinois

I accept your challenge. Please send us, on memorandum, one STA-SHARP DIAMOND TOOL for testing on a Centerless Grinder No. _____

Grinding Wheel: marking _____ diameter _____ width _____

It is understood that this tool, after trial, can either be returned or paid for as we decide.

Name _____

Firm Name _____

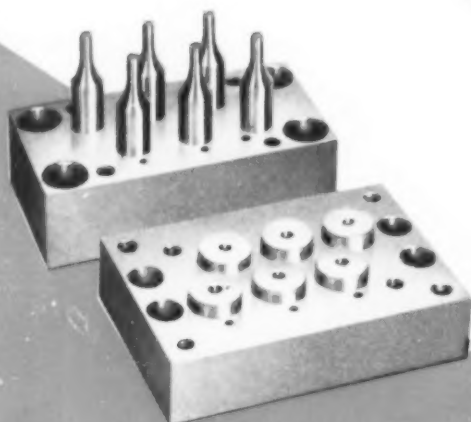
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Special Retainer Plates with

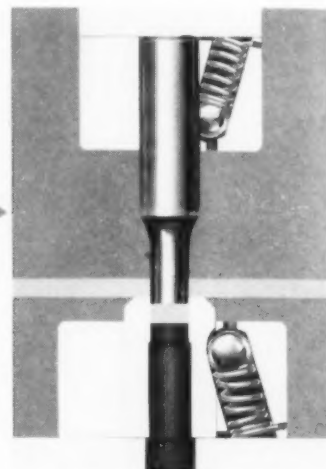
Standardized R-B Features



Each special R-B retainer plate is made from tool steel and all holes are precision ground after hardening—retainers are ready for mounting on your punch and die shoes without further machining and will save many of your skilled man hours in die construction and maintenance.



Gain time in die construction, plus all the advantages of standardized R-B features, where close spacing of punches is necessary and standard individual R-B retainer plates cannot be used—R-B will make special retainer plates holding multiple punches and die buttons to your exact specifications.



Standardized R-B ball locks are built into each special retainer to provide punches and die buttons with the same radial alignment, vertical locking and speed of insertion or removal obtained with standard R-B retainers.

TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY—IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.

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New Taft-Peirce COMPUTING CompAIRator FIGURES AS IT MEASURES

For measuring problems that involve determining two variable dimensions . . . then combining them in a laborious calculation, Taft-Peirce engineers now offer a valuable new time-and-labor-saving tool. An air gage that does the whole job. Measures. Computes. And indicates the result instantly on a single dial.

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For example, the three Computing CompAIR-

ators above indicate center distance, bend, and twist of connecting rods. They do the work of six standard indicators, eliminate human error, and save hundreds of man-hours every year.

For more information on Computing CompAIRators and many other items, get your copy of the new Taft-Peirce Handbook.

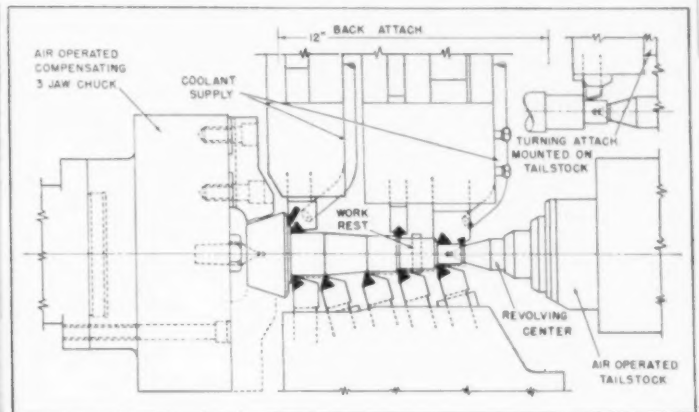
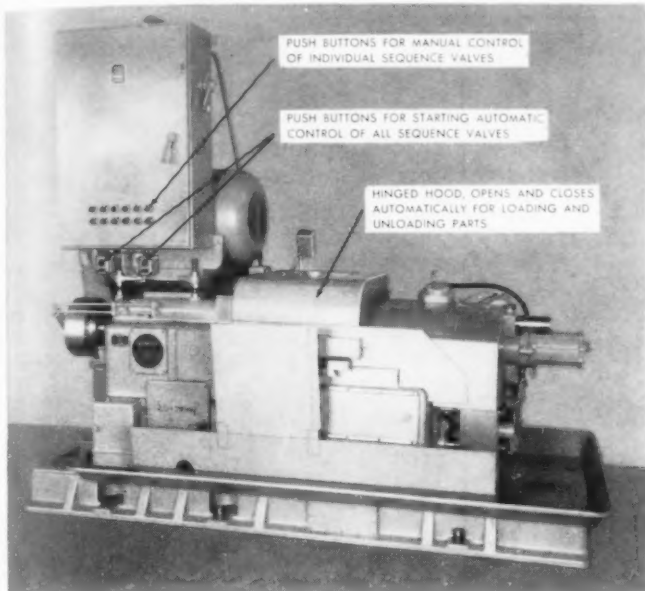


*T-P means
Top Precision*

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MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE Lo-swing PEOPLE" SENECA FALLS, NEW YORK



◀ Tooling area of machine is entirely enclosed, protecting operator from flying chips and coolant.

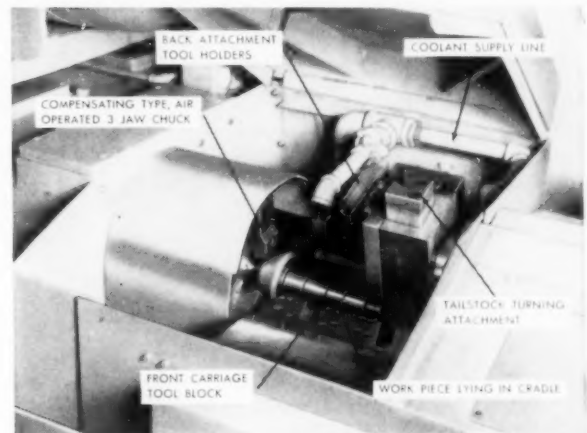
▼ Hinged hood in open position for loading and unloading parts.

Lo-swing LATHE EQUIPPED WITH AUTOMATIC CONTROLS REDUCES HANDLING TIME...

Problem: To reduce handling time and operator fatigue in machining operations on Axle Pinions.

Solution: A Model AR Automatic Lo-swing Lathe, tooled as illustrated, was selected for this job. Work is held on centers and driven with an air-operated, three-jaw compensating chuck. Five carbide front turning tools, two of which are template operated, reduce the length of cut to 1-7/8", which is the length of the taper portion. An additional tool, mounted in a tailstock turning attachment, partially removes surplus material on the threaded diameter in advance of the front turning tool which finish turns this diameter. Six carbide tools on the rear slide face and chamfer the shoulders.

The machine stops automatically at the end of the cycle with spindle stopped, chuck jaws released, tailstock center retracted, hinged hood open and with the machined part dropped into a cradle. The operator simply replaces the finished part with a rough forging and then pushes the two starting buttons, energizing the loader controls, which consecutively close the hood, places the work between centers, closes the



chuck jaws and finally starts the headstock spindle rotation. The automatic cycle from then on is controlled by automatic camming built into the base machine.

The tooling area of the machine is entirely enclosed to protect the operator from flying chips and coolant, while cutting at high spindle speeds. Two starting buttons, wired in series, oblige the operator to use both hands, and are so located that the operator is out of range of the closing hood, thereby preventing accidents.

Control buttons on the door of the starter panel permit normal operation of individual controls and are convenient for setting up and timing loader movements.

Seneca Falls engineering staff is at your disposal to help solve your engineering problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

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PIPE	2" Dia.	3 Seconds
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BRASS	1" x 1" Bar	4 Seconds

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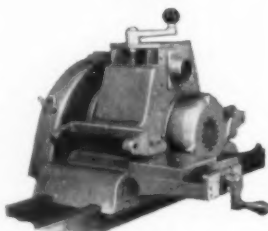
MODEL M-75

A floor model, 2½' x 4' equipped with full 7½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be equipped for wet cutting.



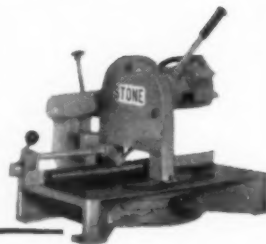
MODEL SS-20

Operates on guided rails for cutting larger structural steel, plate, sheet, with cuts up to nine feet in length. Cuts wet or dry.



MODEL M-14

32" x 34" Bench Model. This mighty little brute, with full 3½ h.p. geared-in-head motor engineered with positive drive, will cut all ferrous and non-ferrous solids up to 2" — pipe and structurals up to 2½". Two models — straight cut-off and swivel head for angle cutting to 45°. Legs available.



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402 Fayette St. Manlius, N. Y.

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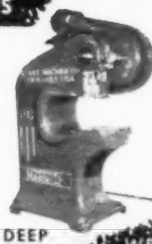
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Page 139.



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Sticks and Rust



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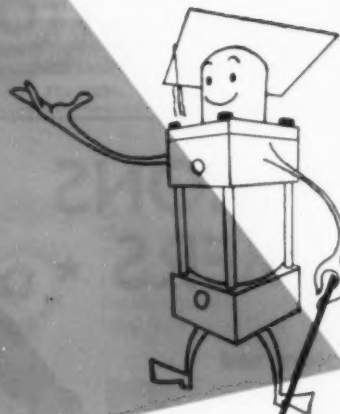


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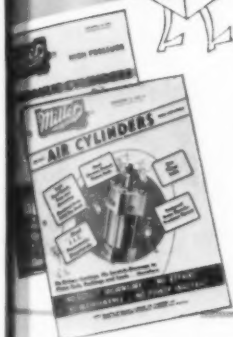


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SEE ... how easily YOU can save countless hours of equipment "downtime" due to delayed delivery of replacement tools and dies ... how to save critical materials by rebuilding all types of worn dies ... how to reamp punches and dies by welding, saving cost of redesign ... how to weld broken tools to operate "good as new" instead of scrapping ... how to avoid complete retooling formerly caused by minor design changes ... how welding builds up dies out of several components, eliminates high machining costs, and permits use of cheaper base materials for non-working surfaces.

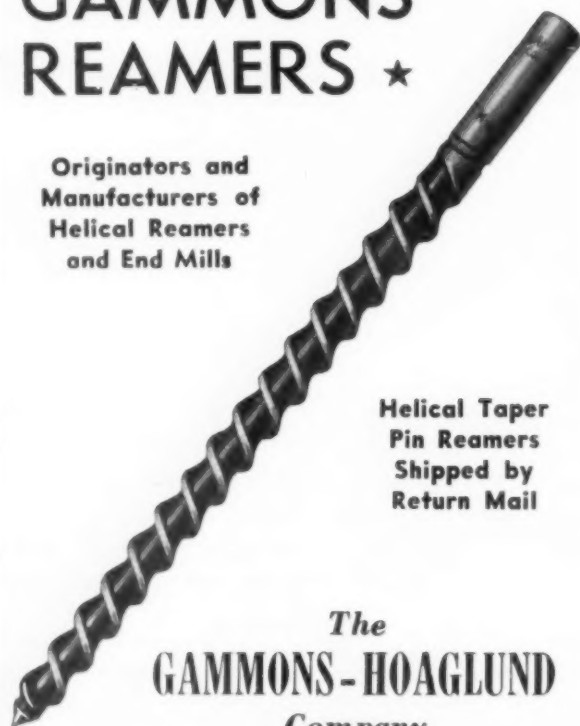
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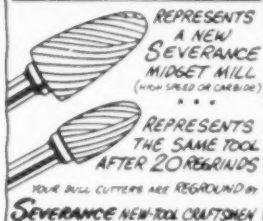
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YOUR DULL CUTTERS ARE REGRIND BY SEVERANCE NEW-TOOL CRAFTSMEN

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★ **We're the Originators** ★
OVER 20 YEARS EXPERIENCE IN THIS MONEY SAVING SERVICE
★ **We've been copied but not surpassed** ★

DEPENDABLE DELIVERIES ARE ASSURED ★ THROUGH SEVERANCE REGRINDING SERVICE
WE REGRIND: MIDGET MILLS, ROTARY FILES, BURS, FILE BANDS, COUNTERBORES, COUNTERSINKS, ETC.

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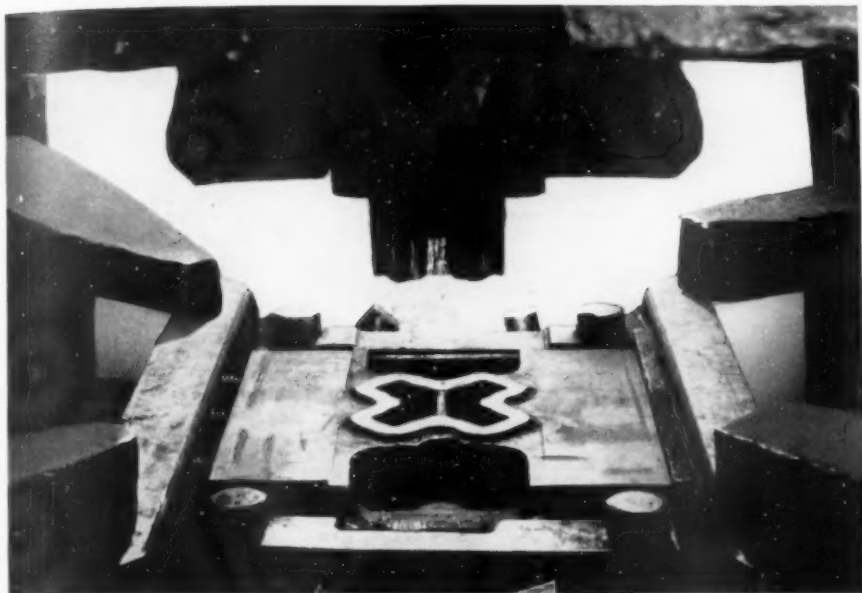
(Our personnel knows of above listings)

Tool Steel Topics



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



In the center is the four-piece, composite trimmer die used in one of the service tests on Lehigh H tool steel. In the cold-trimming of 20,000 drop forgings, the two die components hardened by the high-temperature, "short-cut" method showed only one-half as much wear as the other two die components heat-treated in the usual way.

"SHORT-CUT" Hardening Improves Wear of High-Carbon, High-Chrome Steels

Production men often lose patience, even tear out their hair, while waiting the many long hours necessary for the heat-treatment of tools and dies made from the high-carbon, high-chromium tool steels. When treating large dies, for example, it's not unusual to have a pack-hardening cycle of 24 hours or even longer. But until lately there's been no short-cut that doesn't result in improperly treated tools.

Faster Treatment

That's why we're happy to report that our research men are developing a much faster method of heat-treatment—one that not only promises to save valuable time, but also imparts better wear-resistance than the usual heat-treatment for high-carbon, high-chromium steels.

It's a high-temperature treatment that does the trick. Ordinarily these grades are hardened by a long soak at 1850 F, followed by air-quenching. The new treatment involves a much shorter soak at about 2100 F. By no means perfected as yet, this new wrinkle was developed in

a series of experiments in which the dies hardened at 2100 F were used in actual production work along with similar dies hardened at 1850 F.

Longer Wear

Dies used for cold-trimming drop forgings, for example, were hardened by both methods. These were composite dies, each made up of four assembled sections. Operating conditions were exactly the same. Careful measurements were made at regular intervals to determine the amount of wear between the cutting edges opposite each other. After trimming 20,000 forgings, the wear of the die edges was .012 in. on the pair of trimmer-die components treated by conventional methods; on the dies hardened by the high-temperature cycle the wear amounted to only .006 in.—just half as much.

Data Now Available

Tests are continuing. If you'd like to have the details of our work to date, drop us a line at Bethlehem, Pa. Address your request to Room 1037A, Publications Department, Bethlehem Steel Co.

BETHLEHEM TOOL STEEL ENGINEER SAYS:



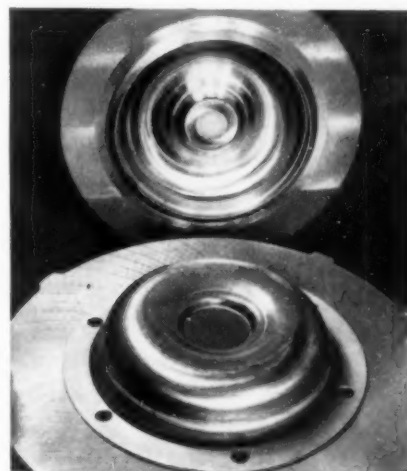
Here are five fundamentals of successful toolmaking.

It's always a challenge for toolmakers to produce tools or dies which will be both hard enough to stand up in service and ductile enough not to crack, either in the making or in use. To get the necessary ductility, most tools are hardened below the maximum obtainable.

Once the proper balance between hardness and ductility has been determined in service, the maintenance of this balance helps to assure good performance. But good tool performance depends on more than that. In fact, there are these five fundamentals which must be considered:

1. Good tool design
2. Sound tool steel, of proper grade
3. Correct heat-treatment
4. Proper grinding
5. Proper application of the tool

These five fundamentals are like links in a chain; a deficiency in any one of these steps, or links, can lead to trouble. Poor tool design, for example, may often result in quenching cracks. Careful attention paid to each of these factors will help you to get the best tool life.



RESTRIKE DIE

This restrike die made of A-H5 tool steel is one of the precision tools used in making parts for torque converters. A-H5 has better wear-resistance than standard oil-hardening steel and holds more accurately to size during heat-treatment. It's a general-purpose, air-hardening grade containing 5 pct chromium, yet it's as economical as most oil-hardening tool steels.

Index of The Tool Engineer Advertisers

May, 1953, Issue

The Index to Advertisers is published as a reader service. Although every precaution is taken to assure correct listing, no allowance will be made for error or omission.

♦User of ASTE Data Sheets

A	
Accurate Bushing Co.	167
Acme Industrial Co.	174
Acme Tool Co.	196
Adamas Carbide Corp.	153
Allegheny Ludlum Steel Corp.	250
Allied Products Corp.	
Richard Brothers Division	284
Aluminum Company of America	186
American Broach & Machine Co.	
Division of Sundstrand Machine Tool Co.	203
American Drill Bushing Co.	232
American Gage & Machine Co.	
Size Control Co., Division	15
American Roller Die Corp.	114
American Society of Tool Engineers	111
Ames, B. C., Co., The	128
Ames Precision Machine Works	216
Anderson, F. E., Oil Co.	123
A-P Controls Corp.	148
Armour & Co.	151
Armstrong-Blum Mfg. Co.	142
Atrax Co.	285
Automatic Steel Products, Inc.	
Cleveland Tapping Machine Co., The, Subsidiary	173
B	
Baird Machine Co.	219
Baker Brothers, Inc.	255
Balas Collet Mfg. Co.	294
Barber-Colman Co.	116
Bath, John, Co., Inc.	251
Baumbach, E. A., Mfg. Co.	256
Bausch Machine Tool Co.	231
Bay State Tap & Die Co.	196
Beaver Tool & Engineering Corp.	30
Beaver Tool Co.	184
Behr-Manning Corp.	239
Bellows Co., The	246
Besly-Welles Corp.	202
Bethlehem Steel Corp.	291
Black Drill Co.	176
Boston Gear Works	244
Boyar-Schultz Corp.	258
Brown & Sharpe Mfg. Co.	241-242
Brush Electronics Co.	171
Bryant Chucking Grinder Co.	182-183
Bryant Machinery & Engineering Co.	
Cleereman Machine Tool Co., Affiliate	209
Buck Tool Co.	144
Buol Machine Co.	253
Butterfield Division	
Union Twist Drill Co.	207
C	
Cadillac Stamp Co.	265
Carboloy	
Department of General Electric Co.	223
Carborundum Co., The	20-21
Card, S. W., Division	
Union Twist Drill Co.	205
Carlton Machine Tool Co.	178-179
Carpenter Steel Co.	269
Cincinnati Shaper Co.	26-27
Circular Tool Co.	168
Cleereman Machine Tool Co., Affiliate	
Bryant Machinery & Engineering Co.	209
Cleveland Cap Screw Co.	159
Cleveland Quarries Co., The	
Sterling Abrasives Division	198-199
Cleveland Tapping Machine Co., The	
Subsidiary of Automatic Steel Products, Inc.	173
Colonial Broach Co.	235
Columbia Tool Steel Co.	134
Comtor Co.	224
Cone Automatic Machine Co.	257
Connecticut Broach and Machine Co., The	125
Consolidated Machine Tool Corp.	
Modern Tool Works Division	185
Crane Packing Co.	226
Crucible Steel Company of America	
Tool Steel Division	175
Hollow Tool Steel Division	274
D	
Danly Machine Specialties, Inc.	273
E	
Darwin & Milner, Inc.	190
Davis Boring Tool Division	
Giddings & Lewis Machine Tool Co.	222
Delta Drill Unit Division	
Rockwell Mfg. Co.	149
Detroit Stamping Co.	134
DeVlieg Microbore Co.	217
Disston, Henry, & Sons, Inc.	228
DoAll Co., The	248-249
Douglas Engineering Co.	194
Dumore Co., The	162
Dykem Co., The	216
E	
Eastman Kodak Co.	
Industrial Optical Division	193
Eclipse Counterbore Co.	279
Engineering Manufacturing Co.	174
Ercona Corp.	218
Eutectic Welding Alloys Corp.	290
Ex-Cell-O Corp.	Inside Back Cover
F	
Farquhar, A. B., Division	
Oliver Corp., The	145
Federal Products Corp.	204
Fellows Gear Sharper Co.	184
Firth Sterling, Inc.	247
Foot-Burt Co., The	268
Ford, M. A., Mfg. Co.	234
Fray Machine Co.	166
G	
Gairing Tool Co.	155
Gammons-Hoaglund Co.	290
Gateco Rotary Bushing Co.	258
General Electric Co.	
Carboloy Department	223
Giddings & Lewis Machine Tool Co.	
Davis Boring Tool Division	222
Gisholt Machine Co.	14-264
Golconda Corp.	283
Gorham Tool Co.	170
Govro-Nelson Co.	176
Greenlee Bros. & Co.	236
Greer Hydraulics, Inc.	132
Grobet File Company of America	272
H	
Hammond Machinery Builders, Inc.	130
Hannifin Corp.	211
Hansell-Elcock Co.	252
Hapman Conveyors, Inc.	220
Hardinge Brothers, Inc.	5
Haynes Stellite Co.	
A Division of Union Carbide & Carbon Corp.	10
Heald Machine Co., The	Inside Front Cover
H. E. B. Machine Tools, Inc.	262
Heinrich Tools, Inc.	165
Hisey-Wolf Machine Co.	137
I	
Ideal Industries, Inc.	152
Interstate Tool Co.	133
J	
Jahn, B., Mfg. Co.	131
Jergens, J. G., Co.	272
Jergens Tool Specialty Co.	280
Jessop Steel Co.	17
Johansson, C. E., Gage Co.	
Division of Swedish Gage Company of America	270
Jones & Lamson Machine Co.	225
K	
Kaufman Mfg. Co.	216
Kearney-Trecker Corp.	188-189
Kearney-Trecker Corp.	
Walker-Turner Division	233
Keller Tool Co.	120
Kelvin Systems, Inc.	258
Kennametal, Inc.	135
Kling Brothers Engineering Works	32
Knight, W. B., Machinery Co.	163

L

Louis Machine Co.	8-9
Louis Machine Tool Co., The	31
Louis Steel Co.	34
Louis & Ide, Inc.	141
L. K. O. Co.	253
Louis Engineering Co.	282
Louis Steel Treating Co.	275
Louis-Railway Corp.	136
Louis Inc.	254

M

Magna Engineering Corp.	213
Manhattan Rubber Division,	
Raybestos-Manhattan, Inc.	230
M B Products	216
Metal Carbides Corp.	210
Meyers, W. F., Co.	176
Michigan Tool Co.	261
Micromatic Hone Corp.	192
Miller Motor Co.	289
Misal Machinery, Inc.	124
Modern Tool Works Division,	
Consolidated Machine Tool Corp.	185
Moline Tool Co., The	224
Morse Twist Drill & Machine Co.	22-23
Moyle & Merryweather Machinery Co., The	150

N

National Acme Co.	238
National Automatic Tool Co.	271
National Broach & Machine Co.	229
National Tool Co.	221
National Twist Drill & Tool Co.	6-7
Nelco Tool Co., The	172
New Hermes, Inc.	253
Nilson, A. H., Machine Co.	124
Nilsson Gage Co., Inc.	144
Northwest Tool Co.	194
Norton Co., The	
Machine Division	24-25

O

Oakite Products, Inc.	243
Ohio Crankshaft Co., The,	
Tocco Division	263
Ohio Knife Co., The	227
OK Tool Co.	277
Oliver Corp.	
A. B. Farquhar Division	145
Ortman-Miller Machine Co.	267
Ottomiller, W. H., Co.	224

P

Parker-Majestic, Inc.	195
Pioneer Engineering & Manufacturing Co.	146
Pioneer Tool & Engineering Co.	122
Pioneer Tool Engineering, Inc.	164
Pope Machinery Corp.	11
Pratt & Whitney Division,	
Niles-Bement-Pond Co.	19, 28-29, 161

R

R and L Tools, Inc.	276
Rahn Granite Surface Plate Co.	260
Raybestos-Manhattan, Inc.,	
Manhattan Rubber Division	230
Ready Tool Co.	216
Reynolds Metals Co.	201
Richard Brothers Division,	
Allied Products Corp.	284
Richards, J. A., Co.	234
Ring Punch & Die Co.	220
Rockwell Mfg. Co.,	
Delta Drill Unit Division	149
Russell, Holbrook & Henderson, Inc.	177
Ruthman Machinery Co.	194

S

Scherr, George, Co., Inc.	220
Schrader's, A., & Son,	
Division of Scoville Mfg. Co., Inc.	187
Seneca Falls Machine Co.	287
Service Machine Tool Co.	288

Severance Tool Industries	290
Sidney Machine Tool Corp.	200
Simonds Abrasive Co.	138
Simonds Saw & Steel Co.	215
Simplex Machine Tool Corp.	266
Size Control Co.,	

Division of American Gage & Machine Co.	15
Skinner Chuck Co.	156
Snow Mfg. Co.	157
Solar Steel Corp.	240
S-P Mfg. Co.	143
Spiral Step Tool Co.	256
Stadco Mfg. Co.	214
Standard Electrical Tool Co.	129
Standard Gage Co.	4
Standard Machine & Tool Co., Ltd.	272
Standard Pressed Steel Corp.	12-13
Standard Tool Co.	281
Staples Tool Co.	253
Starrett, L. S., Co., The	16
Sterling Abrasives Division, The,	
Cleveland Quarries Co.	198-199
Stocker & Yale, Inc.	154
Stone Machinery Co.	288
Sturtevant, P. A., Co.	260
Summit-Roberts Tool Co.	196
Sundstrand Machine Tool Co.	180-181
Sundstrand Machine Tool Co.,	
American Broach & Machine Co., Division	203
Sun Oil Co.	2
Super Tool Co.	191
Superior Hone Corp.	115
Swanson Tool & Machine Products, Inc.	184
Swedish Gage Company of America,	
Johansson, C. E., Gage Company Division	270
Syntro Co.	119

T

Taft-Peirce Mfg. Co., The	286
Tietzmann Tool Corp.	174
Tubular Micrometer Co.	280
Turchan Follower Machine Co.	197

U

Union Carbide & Carbon Corp.,	
Haynes-Stellite Co., Division	10
Union Twist Drill Co.,	
Butterfield Division	207
Card, S. W., Division	205
Union Division	206
U. S. Drill Head Co., The	121
U. S. Tool Co.	278

V

Vanadium-Alloys Steel Co.	245
Verson Allsteel Press Co.	Back Cover
Vlier Mfg. Co.	147
Vulcan Tool Co.	260

W

Waldes-Kohinoor, Inc.	259
Wales-Strippit Corp.	18
Walker, O. S., Co., Inc.	169
Walker-Turner Division,	
Kearney & Trecker Corp.	233
Ward Leonard Electric Co.	113
Ward Machinery Co.	184
Warner & Swasey Co., Inc.	214
Waukesha Tool Co.	158
Wendt-Sonis, Inc.	126-127
Wesson Co.	212
Wesson Metal Corp.	237
Western Tool & Mfg. Co.	278
Wilson Mechanical Instrument Division,	
American Chain & Cable Co.	256
Wilton Tool Co.	118
Winter Brothers Co.,	
Division of National Twist Drill & Tool Co.	6-7

Y

Yoder Co., The	190
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Z

Zagar Tool Co.	115
Ziegler, W. M., Tool Co.	174

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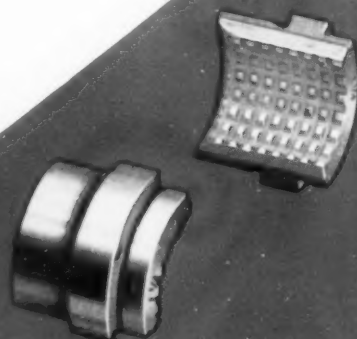
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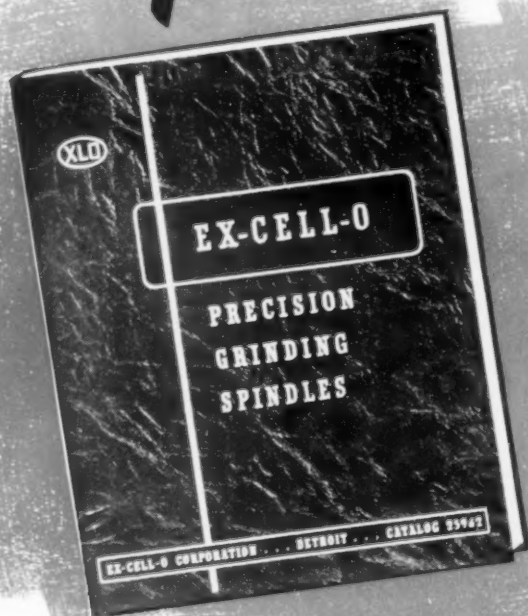
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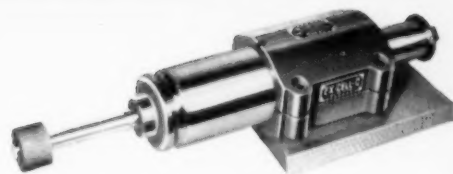
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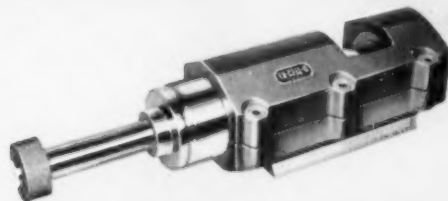
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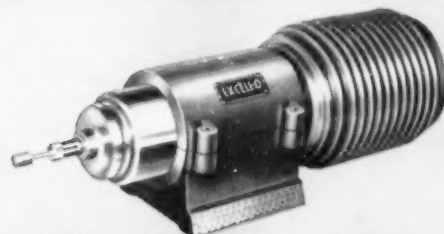
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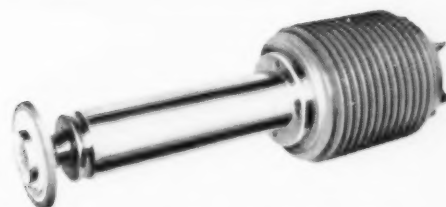
Double-body, belt-driven internal grinding spindle.



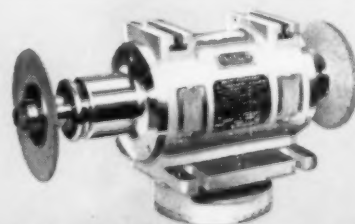
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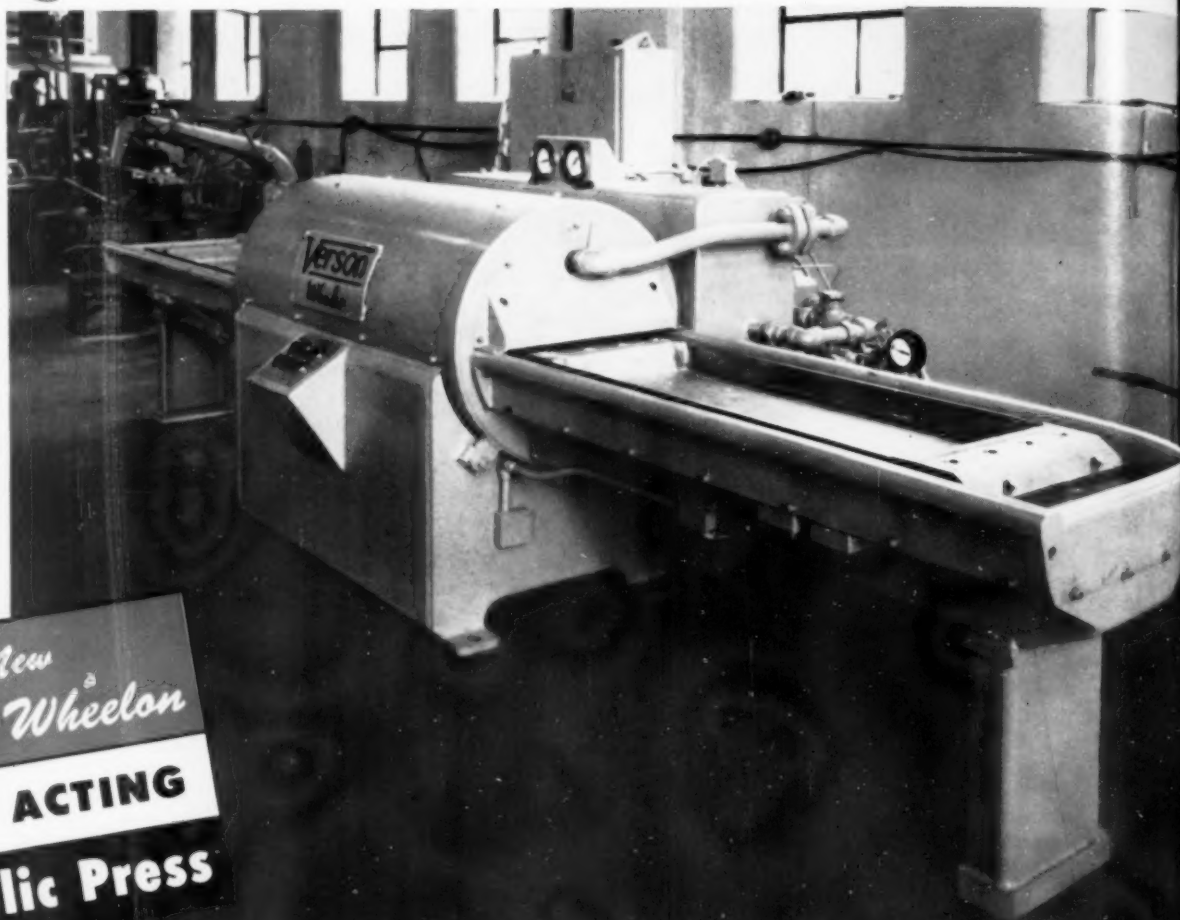
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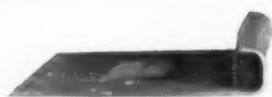
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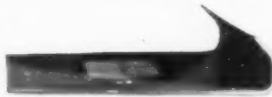
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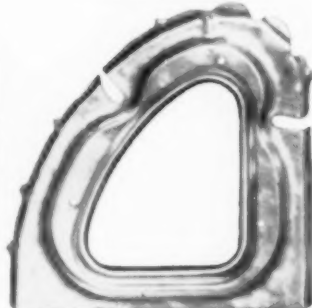
Formed in a
Verson-Wheelon Press



Formed in a conventional
rubber pad press



Formed in a
Verson-Wheelon Press

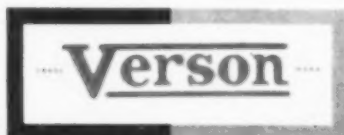


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